ELECTRICAL-ELECTRONICS ENGINEERING 2025-2026 COURSE CONTENTS

TRD109 Turkish Language-1 (2- 0-2) 2 ECTS

What is language? The place and importance of language as a social institution in national life. The place of Turkish language among world languages. The development of Turkish language and its historical periods. The development of Turkish language and its historical periods. Sounds in Turkish and their classification. Sound properties of Turkish and rules related to phonetics. Syllable information. Derivative suffixes of Turkish and their application. General information about composition, plan and application to be used in writing composition. General information about composition, plan and application to be used in writing composition. Writing petition and resume. Spelling and punctuation.

YDİ107 English-1 (2- 0-2) 2 ECTS

Greetings, names, and ages. Numbers. Days, months and seasons. This is ……, that is …..What time is it. Action in Progress, Who …….. ?, What …… ?, Where. Talking about present habits, ideas, opinions. Propositions of time: at, on, in; Talking about schedules and calendars. Abilities and inabilities: can, can't.A family tree. Possessive pronouns. family members Obligations prohibitions and lack of necessity: must, mustn't. Obligations prohibitions and lack of necessity: don't/ doesn't have to.

FİZ1111 Physics-I (4- 0-4) 6 ECTS

Measurement and vectors. Motion in one dimension and plane. Newton's laws of motion and their applications. Work and energy theorems in translational motion, power. Potential energy and conservation of energy. Linear momentum and collisions. Dynamics of the center of mass and particle system. Kinematics of rotational motion. Dynamics of rotational motion, torque, and angular momentum. Work and energy in rotational motion. Rolling motion. Statics, equilibrium and elasticity of solids. Vibration and wave motion. Universal gravitation law, Kepler's laws, planetary and satellite motions.

FİZ1105 Physics- Lab.-I (0- 2-1) 2 ECTS

Basic Laboratory Principles, Basic Quantities and Unit Systems, Physical Measurements and Errors, Introduction to Laboratory Equipment, Free Fall Experiment, Simple Pendulum Experiment, Friction Coefficient and Centripetal Force Effects Experiments, Uniform Rectilinear and Acceleration Motion Experiment, Newton's Second Law of Motion Experiment, Conservation of Energy Experiment Experiment, Static Equilibrium of Rigid Bodies Experiment, Elastic Collision Experiment, Inelastic Collision Experiment

MAT1161 Mathematics-I (4-0-4) 6 ECTS

Number sequence and limit of a sequence. Limit of a function and one-sided limits. Continuity and properties of continuous functions. Derivative, geometric meaning and properties. Derivatives of basic elementary functions. Higher order derivative and differential. Applications of derivative, Basic theorems related to derivative. Examination of changes of functions and drawing their graphs. Indefinite integral and its properties. Change of variable method. Partial integration method. Integrals of rational and irrational functions. Binomial integral. Integrals of trigonometric and hyperbolic functions. Definite integral. Applications and properties of definite integral. Area calculation. Volume and arc length.

KIM1105 Chemistry (4-0-4) 6 ECTS

The place and importance of chemistry in Electrical-Electronics Engineering, matter and chemistry. Basic laws of chemistry, atomic and molecular weight, mole, Avogadro's number, chemical calculations. Solids; types of solids and their properties, Conductivity. Magnetic Properties. Experiment: Weighing and measuring substances. Chemical Thermodynamics. Reaction rate and equilibrium. Solutions; solution, solubility, factors affecting

solubility. Concentration calculations (Molarity, normality, %, molality, ppm). Experiment: Solution preparation. Equilibrium in aqueous solutions, pH calculations. Batteries. Electrolysis. Experiment: Conducting an electrolysis experiment. Electrochemistry and corrosion. Periodic table and structure of the atom. Chemical bond. Valence concept and redox reactions.

KIM1109 Chemistry Lab. (0- 2-1) 2 ECTS

Basic laboratory principles. Basic quantities and unit systems, Chemical measurements and errors, Introduction to laboratory equipment. Solution types and methods of preparing these solutions experiment, Purification techniques of mixtures by crystallization and distillation. The experiment of determining the melting and freezing points of pure substances. The experiment of examining the reduction reaction of kmno4 in acidic medium by titration. The experiment of determining the heat capacity of a metal by simple calorimetric method. The experiment of determining the ellipse of magnesium oxide formation. The experiment of determining the molecular weight of a pure substance by the freezing point depression method. The experiment of determining the hydrate water in a substance containing crystal water. The experiment of determining acetic acid in vinegar by titrimetric method.

EET1101 Fundamentals of Electrical and Electronics Engineering I (2-0-2) 2 ECTS

The general structure of the atom and its electrical importance. Electrical quantities such as current, voltage, resistance. Relationships of resistive elements with temperature. Work, power, energy and related transformations between them. Electrical Laws; Ohm's Law, Kirchhoff's Laws and simple applications. Single-source DC circuits and simple analysis in these circuits. Series circuits, parallel circuits, mixed circuits and their equivalents. Chassis, grounding and circuit reading. Analysis methods in single and multiple-source simple circuits. Special circuit analysis with the ladder method. Circuit analysis with the help of branch current approach and electrical laws. Dynamic circuit elements such as inductors and capacitors and their analysis in DC circuits. Definitions of some electrical quantities such as period, frequency, angular velocity in AC. Instantaneous, average and effective value in sine and cosine signals and various applications. Reactance, impedance and phasor applications in AC circuits. Simple AC circuits and analysis and power in these circuits.

EET1102 Computer Aided Drawing (2-2-3) 4 ECTS.

Introduction of AutoCAD interface. Cartesian and Polar coordinate systems. Snap, Grid, Ortho, Polar, Osnap, DYN, LWT, TPY and QP tools and examples. Line and Polyline Commands. Transforming objects drawn with these tools. Circle, arc, rectangle, polygon, ellipse and spline drawing commands. Scaling. Writing Hatch and gradient commands. AutoCAD drawings of various electrical devices and simple electrical installations. Copy, move, rotate and scale commands. Stretch, mirror, trim, extend, extend, fillet, chamfer, chamfer commands. Rectangular, circular and along the path duplication commands Offset and align commands. Draw order, hatch edit, polyline edit, spline edit Layers. Block Commands. Introduction to three dimensional AutoCAD drawings. 3D viewpoints. Extrude and prespul commands 3D viewpoints and 3D subtraction and addition of parts.3D Geometric drawing applications. 3D Geometric drawings.

EET1103 Algorithms and Programming (2 0 2) 2 ECTS

Problem solving. Input-output processing process. Algorithm design. Precision, finiteness, efficiency in algorithms. Constants, variables, and expressions. Arithmetic, relational, and logical operators. Input-output statements. Conditional and Repeat statements. Vector and matrix representations. Character information operations. Subroutine and Function subroutines. Recursive functions. Applications in a structured programming language.

TRD110 Turkish Language -II (2- 0-2) 2 ECTS

Forms of expression in composition. Story, description. Essay, article. Noun conjugations in Turkish. Verb conjugations in Turkish. Words in terms of meaning and function - nouns, adjectives, adverbs. Pronouns, verbs, prepositions. Elements of the sentence. Sentence analysis and application. Reading and examining works related

to the world of literature and thought. Reading and examining works related to the world of literature and thought. Rhetorical applications. Rules to be followed in the preparation of scientific articles. Expert report. Spelling and punctuation.

YDİ108 English-II (2- 0-2) 2 ECTS

Possession (have, has got). There is, there are, quantitative adjectives. Prepositions (under, near, next ...). Making suggestions (let's, shall, would ...). Making suggestions (let's, shall, would ...). Asking for help (can you ...). Adverbs of Frequency (never, always, often ...). Present cont. Tense. General exercises on the previous subjects. General exercises on the previous subjects. Simple past tense. Exercises with regular and unregular verbs on Simple past tense. Past use of verb "to be" with affirmative, negative and interrogative forms. General revision and exercises.

FİZ1112 Physics-II (3- 0-3) 5 ECTS

Charge and matter concepts. Electric field. Gauss's law. Electric potential. Capacitors and dielectrics. Current and resistance. Direct current circuits. Magnetic field. Magnetic field sources. Ampere's law. Faraday's law of induction. Self-induction and RL circuits. Alternating currents. Maxwell's equations, electromagnetic waves.

FİZ1106 Physics Lab.-II (0- 2) 1

Basic laboratory principles. Basic quantities and unit systems. Physical measurements and errors. Introduction to laboratory equipment, Reading resistance values, series connected resistance circuits and parallel connected resistance circuits experiment, Ohm's law experiment, Kirchhoff's law experiment, Wheatstone bridge experiment, Biot-savart law experiment magnetic force experiment, Introduction of inductive and capacitive circuit elements and circuits experiment, Faraday's induction law experiment

MAT1162 Mathematics-II (4- 0-4) 6 ECTS

Derivative of multivariable functions. Higher order partial derivatives. Chain rule in derivative, derivative of implicit functions. Taylor expansion of two-variable functions. Double integrals, area transformations in double integrals. Applications of double integrals. Triple integrals. Area transformations in triple integrals. Applications of triple integrals. Matrices. Determinants. Systems of linear equations.

MAT1146 Linear Algebra (2-0-2) 4 ECTS

Vectors. Vector sum and number-vector product, vector spaces, scalar product, length of a vector and angle between two vectors, linear combination, linear dependent and independent vectors, base and dimension, orthogonal and orthonormal vectors, antibase and antispace, subspace. Matrices and matrix operations, vectors and matrices, invertible matrices, elementary row operations and echelon form, determinants and their properties, determinant expansions, linear transformations and their properties, representation of transformations by matrices and base transformations, rank of a linear transformation, systems of linear equations and solution spaces, Cramer system, rank rule and geometric interpretation, convex sets, characteristic value and characteristic vectors, diagonalization of symmetric matrices, quadratic forms, inner product and inner product spaces, vector and mixed products, area and volume.

EET1104 Fundamentals of Electrical and Electronics Engineering -II (2-0-2) 3 ECTS

DC Electrical Circuits: Application of basic electrical laws in the analysis of simple electrical circuits, Using the branch current approach in the analysis of simple electric circuits, Analysis of loop currents in the analysis of electric circuits, Analysis of node voltages in the analysis of electric circuits, Additional (superposition) theorem in the analysis of electric circuits, Thevenin's theorem in the analysis of electric circuits, Norton's theorem in the analysis of electric circuits, Maximum Power Transfer, AC electric circuits: Concept of reactance and impedance

in AC circuits, Analysis of loop currents and node voltages in the analysis of electric circuits, Additional (superposition) theorem in the analysis of electric circuits, Thevenin's theorem and Max. Power Transfer, Norton's theorem in the analysis of electric circuits, Power and compensation of electric circuits.

EET1106 Fundamentals of Electrical and Electronics Engineering Laboratory (0-2-1) 2 ECTS

Introduction to Laboratory Equipment, Reading and Measuring Resistance Values, Measuring Voltage and Current, Loop Current Method, Node Voltage Method, Superposition (Additionality) Theorem, Thevenin/Norton Theorem, Power measurement in DC circuits, Use of Oscilloscope and Signal Generator, Investigation of the Behavior of Series RC Circuit in Direct Current, Use of AC measuring devices in various measurements, Various circuit analysis applications in AC circuits, Applications of Various Circuit Theorems in AC circuits, Power measurement in AC circuits.

AIT209 Atatürk's Principles and Revolution History-1 (2-0-2) 2 ECTS

The purpose of studying Atatürk's Principles and Revolution History and the concept of Revolution. The reasons that prepared the collapse of the Ottoman Empire and the Turkish Revolution. The disintegration of the Ottoman Empire, the Tripoli War, the Balkan Wars, the First World War. The Armistice of Mondros. The situation of the country against the occupations and Mustafa Kemal Pasha's reaction, Mustafa Kemal Pasha's arrival in Samsun. The first step for the National Struggle, organization through congresses: Amasya, Erzurum and Sivas Congresses. Kuvayı Milliye and Misak-ı Milli. The opening of the Turkish Grand National Assembly. The Turkish Grand National Assembly taking over the management of the War of Independence. The Treaty of Sevres. Political events until the Sakarya Victory. Military developments until the Sakarya War. The Sakarya War and the Great Offensive. Mudanya Armistice, Lausanne Peace Treaty.

MAT2171 Differential Equations (4- 0-4) 4 ECTS

First Order Ordinary Differential Equations and Engineering Applications, Linear Differential Equations and Engineering Applications, Green's Functions, Introduction to Linear Algebra, Simultaneous Linear Differential Equations, Finite Differences, Mechanical Systems and Electrical Circuits, Fourier Series and Integral, Laplace Transform. Partial Differential Equations, Derivation of Equations, D'Alembert Solution of Wave Equation, Separation of Variables Method, Numerical Solution of Partial Differential Equations, Bessel Functions and Legendre Polynomials, Vector Spaces and Linear Transformations, Vector Analysis, Calculus of Variations, Analytical Functions of Complex Variables.

EET2101 Circuit Theory-I (3-0-3) 4 ECTS.

Introduction of circuit elements, active-passive circuit elements. Voltage and current sources, source transformations. Kirchhoff's voltage and current laws. Circuit analysis methods: Loop analysis method. Nodal analysis method. Circuit theorems: Superposition theorem. Thevenin's theorem. Norton's theorem. Maximum power theorem. Transient behavior of RC circuit (Charge state). Transient behavior of RC circuit (Discharge state). Transient behavior of RL circuit. Transient behavior of RLC circuit. Steady state analysis of RLC circuits.

EET2102 Circuit Theory-II (3-0-3) 4 ECTS.

Circuit topology and creation of circuit graph. Sinusoidal sources and phasor representations. Frequency domain responses of resistor, coil and capacitor elements. Sinusoidal steady state analysis of RL, RC and RLC circuits; concepts of impedance, resistance, reactance and admittance, conductance and susceptance. Sinusoidal steady state analysis methods of complex circuits with dependent and independent sources; mesh currents and node voltages method. Thevenin and Norton theorems. Magnetic coupling elements; linear and ideal transformers. Sinusoidal steady state power; instantaneous power, active, reactive and complex power. Power factor and its correction. Three phase systems; star and delta connection. Important properties of Laplace and inverse Laplace transform. Circuit analysis with Laplace transform. Laplace equivalents of resistance, inductance and capacitance. Analysis of first order RL, RC and second order RLC circuits with Laplace transform.

EET2103 Electronics-I (3-0-3) 4 ECTS.

The theory of semiconductor. P and N type semiconductors. Diode types, their structure and characteristics. Rectifiers. Clippers and clampers. Junction transistors: current relationships and characteristics. Common base, common emitter and common collector circuits as an amplifier. HFE current gain and analytical expression of transistor characteristics. Transistor biasing methods. Stability factor. DC analysis of transistor circuits. Basic structure and characteristics, biasing methods and DC analysis of FET and MOSFET.

EET2104 Electronics-II (3-0-3) 4 ECTS.

BJT's small signal analysis, voltage and current gains, input-output impedances. Small signal analysis of cascade amplifiers. Power amplifiers: Class A, B and C amplifiers. operational amplifiers. Voltage regulator: parallel, series, current limiting and switching regulators. 555 timers.

EET2105 Digital Electronics-I (3-0-3) 4 ECTS

Analog and digital concepts, binary, octal, decimal, hexadecimal number systems and their transformations. Basic logic gates; AND, OR, NOT, special logic gates, structure of gates; RTL, DTL, TTL, ECL circuits, digital integrated parameters, classification, Bipolar and MOS integrated types. Boolean Algebra, De Morgan Rule. Extraction of logic functions, definition, truth table, extraction of Karno diagram, "don't care" cases, simplification, minterm, maxterm expansions and simplification. Transformation of gates, implementation of functions with AND NOT OR NOT gates. Encoders, decoders, code converters, multiplexers and demultiplexers, comparators and arithmetic operations.

EET2106 Digital Electronics-II (3-0-3) 4 ECTS

Sequential logic concept, functions, definition and types of multivibrators; monostable, astable, bistable multivibrators. Flip-flop concepts, types; RS, JK, D, T, Master/Slave RS flip-flops. Asynchronous sequential circuit design, asynchronous counters, synchronous sequential circuit design, synchronous counters. Ring, cascade counters, up and down counters, counter applications, State diagrams and state reduction of sequential logic circuits. Registers, shift register applications. Memory elements, memory types, programmable logic elements, PLA, PAL, GAL. Design of arithmetic-logic units with sequential circuit elements.

EET2107 Electromagnetic-I (2 0 2) 2 ECTS

Vector algebra; scalar and vector products, unit vector, position and displacement vectors, scalar and vector field definitions. Coordinate systems; Cartesian, cylindrical and spherical coordinate systems, transformations between coordinate systems. Line, surface and volume integrals. Coulomb's Law; force calculation on a point charge, superposition principle, electric field, electric field at a point due to point charge/charges. Force and electric field calculations due to charge distributions. Gauss's Law; electric flux, flux density, Gaussian surfaces, relationship between flux density and electric field. Divergence; flux density divergence, divergence theorem. Electric potential and potential energy; conservation property of electrostatic field, potential of a point, potential between two points. Gradient, relationship between electric field and potential, energy in static electric field.

EET2108 Electromagnetic-II (2 0 2) 2 ECTS

Current and current density; conductors and insulators, moving charges, convection and conduction current, conductivity, resistivity, resistance, Ohm's law, conductor-dielectric boundary conditions. Capacitance and dielectric materials; polarization, electrical relative permittivity, multilayer dielectric capacitors, energy stored in a capacitor, boundary conditions on the separation surface of two different dielectric material media. Biot-Savart Law; magnetic field, basic components of magnetic field, calculation of magnetic field around a current-carrying conductor, magnetic field calculations of solenoid and toroidal elements. Ampere's Law: rotational calculation, magnetic permeability, relationship between magnetic field intensity and magnetic flux density, applications of

Ampere's law, relationship between current density and magnetic field intensity. Potential magnetic field vector, Stokes' Theorem, force and moment in magnetic field, Lorentz force in combined electric and magnetic fields, work and power calculations. Faraday's Law; electromagnetic induction and its varieties. Magnetic energy and magnetic forces, inductance, self and mutual inductance concepts, magnetic circuits and their applications, air gap magnetic circuits, B-H curve. Ampere's Law for magnetic circuits. Lenz's Law.

EET2109 Electronics Laboratory-I (0-2-1) 2 ECTS.

Design and implementations of diode circuits: clippers, clampers, half-wave and full-wave rectifier experiments. Connecting the Zener diode. LED diode applications. Design and testing BJT amplifiers. Biasing circuits of BJTs. Obtaining DC characteristic and switching behaviors of BJT, FET and MOSFETs

EET2110 Electronics Laboratory-II (0-2-1) 2 ECTS.

BJT amplifiers: experiments of common-emitter, common-base and common-collector amplifiers. Small signal analysis of multiple amplifiers. FET amplifiers. Low-frequency power amplifiers. linear and nonlinear applications of operational amplifiers: voltage comparator, Schmitt trigger, square wave oscillator, voltage follower and active filter circuits. 555 integrated circuits and applications. Fixed and adjustable voltage regulator experiments.

EET2111 Digital Electronics Laboratory-I (0-2-1) 2 ECTS

Basic logic gates; AND, OR, NOT, Encoders, decoders, code converters, multiplexers and demultiplexers, comparators and arithmetic operations.

EET2112 Digital Electronics Laboratory-II (0-2-1) 2 ECTS

Oscillator circuit. Examination of RS, JK, D, T Flip-flops operation. Asynchronous counter design. Design and implementation of 7493 and 4026 4 Bit Up BCD Counters. Synchronous Counter Design with Flip-flops. Programmable 4 Bit Binary Up-Down Synchronous Counter Design. 74192 Programmable 4 Bit BCD Up Down Counter. Shift Register. Latch, 3-State Buffer, Analog Switch, RAM. A/D and D/A Converters.

AIT210 Atatürk's Principles and History of Revolution-II (2-0-2) 2 ECTS

The strategy of the Turkish Revolution, revolutions made in the political field: declaration of the republic, abolition of the caliphate, the Progressive Republican Party and the Takrir-i Sükun Period, revolutions made in the field of law, revolutions made in the field of education and culture, revolutions made in the economic field, the attempt to switch to a multi-party system and some domestic political events, revolutions made in the social and communal fields, Turkish foreign policy in the Atatürk period, Turkish foreign policy between the years 1923-1932, Turkish foreign policy between the years 1932-1938, Atatürk's Principles: Republicanism, Nationalism. Populism, Statism. Secularism, Revolutionism.

EET2113 Numerical Analysis (2-0-2) 2 ECTS

Definition of Numerical Analysis, Mathematical Modeling, and Solving Engineering Problem, Types of Errors, Error Analysis, Taylor Series and Its Applications in Numerical Analysis, Solving Linear Equation Systems, Gauss Elimination Method, Gauss-Jordan Method, Jacobi and Gauss-Seidel Methods, Solving Nonlinear Equation Systems, Graphical Method, Bisection Method, Regula-Falsi Method, Simple Iteration Method, Newton-Raphson Method, Secant Method, Least Squares Method, Curve Fitting, Interpolation, Newton’s Divided Difference Interpolation Polynomials, Lagrange Interpolation Polynomials, Numerical Integration Methods, Rectangle Method, Trapezoidal Method, Simpson’s Method, Midpoint Method, Gauss Method, Solution Methods for Differential Equations, Euler Methods, Runge-Kutta Methods

EET2114 Engineering Software (2-2-3) 4 ECTS

Design, analysis, and simulation software commonly used in electrical and electronics engineering. Introduction to programming with MATLAB, general structure of the MATLAB program, variables, numbers, and constants, operators and functions, operations with matrix and vector variables, loop structures and controls, symbolic computations, solving equation systems and polynomials, plotting graphs in MATLAB, and creating function files. Usage of MATLAB/Simulink, introduction to electronic circuit simulation software, utilization of menus, circuit analysis, and performing example simulations and applications in electronic circuit simulation software.

EET2115 Electromechanical Energy Conversion (2-0-2) 2 ECTS.

Introduction to electrical engineering and current problems. Basic laws related to electromagnetic systems. Solution of electromagnetic circuit problems. Development of permanent magnet materials. Magnetic circuits with coils and permanent magnets. Solution of magnetic circuit problems with coils and permanent magnets. Giving the energy balance equation for an electromechanical system. Relationship between energy, co-energy and torque. Energy, self and counter inductances, torque in a linear electromechanical system. Solution of sample problems related to electromechanical systems. Analysis of reluctance motor. Single and three phase transformers. Auto and instrument transformers

EET2116 Electrical and Electronics Engineering Applications of Mathematics (2-2-3) 4 ECTS.

Laplace transforms. Laplace transforms of initial value problems, Convolution theorem. Modelling engineering systems with state-space equations. Solution of state space equations with eigenvalues and eigenvectors. Complex analysis. Complex functions, limit and continuity, derivative. Complex integral, Complex series. Power, Taylor and Laurent Series. Fourier series and transforms. Fourier series and its electrical engineering applications. Partial differential equations. Introduction to optimization, classified optimization, linear programming, langrage multipliers.

EET2117 Occupational Health and Safety (2-0-2) 2 ECTS.

Definition of Occupational Health and Safety. OHS Purpose. Relationship between Occupational Safety and Science. Occupational Health and Safety Responsibilities and Costs. System Approach. Prevention Priority. Why Occupational Health and Safety. Occupational Safety Culture. Historical Development of Occupational Health and Safety in the World. Historical Development of OHS in Turkey. Various risk factors. Occupational Diseases

EET2118 Electrical-Electronics System Design (2-2-3) 4 ECTS

Definitions, characteristics, and differences between electrical and electronics development boards. Introduction to Arduino, types and features of Arduino boards, installation and usage of the Arduino software interface. Practical circuit setup and use of simulation software. Basic algorithm and programming structures, local and global variable types and their usage. Fundamental Arduino commands and serial port communication. Button usage in Arduino and Pull-Up/Pull-Down configurations. Digital input-output applications, sensor applications, LCD applications, analog operations, and motor control applications.

EET2119 Electric Energy Economics (2-0-2) 2 ECTS.

Fundamental economic concepts. Economic decision-making methods (present value, annual value, future value, payback period). Economic decision-making methods (ınternal and external rate of return methods, and expected net present value). Minimum cost and maximum profit. Unit cost calculations of electrical energy (tl/kwh). Optimal power sharing among power plants. Determination of economic voltage in electricity generation. Energy demand forecasting methods. Analysis of energy losses.

EET2120 Object Oriented Programming (2 2 3) 4 ECTS

Introduction to Object Oriented Programming, Fundamentals of C# programming language, basic data types, Type conversions, Operators, Flow control statements, methods, arrays, Classes and Access Controllers, Inheritance, Polymorphism and Helicity, Virtual methods, abstract classes and interfaces, Exception method, delegates and events, Preprocessors, Basic Input – Output Processing, Graphical User Interface Design, Database, Database Applications.

İST2134 Probability and Statistics (3-0) 3

Definition of probability. Probability actions. Application areas of probability and statistics. Discrete probability, randomness, finite probability space, probability measure, conditional probability, Bayesian theory. Discrete random variables, binomial, poisson, geometric distributions. Mean and variance. Integer random variables. Continuous random variables, exponential and normal distribution, probability density functions. Calculation of mean and variance, central limit theory, compound distributions. Linear regression and correlation. Multiple linear regression. Statistical estimation theory. Chi-square test. Curve fitting. Sampling distributions, nature and means of sampling, random approaches to sampling, simple method, smoothed sampling, clustering. Data analysis, graphical and numerical operations. Markov chains, queuing.

EET3101 Control Systems (3-0-3) 4 ECTS

Control System Concepts, Open-Loop and Closed-Loop Control System Examples, Characteristics, classification, and control criteria of systems, Transfer function and its characteristics, Block diagrams and reduction techniques, Signal flow graphs and reduction techniques, State diagrams, Modeling of electrical systems, Modeling of mechanical and electromechanical systems, First- and second-order control systems and their characteristics, Principles of control system design, Analysis and design of PI, PD, and PID controllers, Root locus plotting and its role in control systems, Controller design using root locus technique, Ziegler-Nichols and other controller tuning methods.

EET3102 Microprocessors (3-0-3) 4 ECTS

Definition and Historical Development of Microprocessors, Processor Production Stages, Moore's Law, RAM, ROM, EPROM, EEPROM Structures, RISC and CISC Architectures, Comparison of Microprocessors and Microcontrollers, Number Systems, Microprocessor Architecture and Working Principle, Architectural Structure of 8085 8-bit Microprocessor, Pin Structure of 8085, Working Principle, Addressing Modes, Instruction Sets, 8085 Instruction Sets, 8255 Integrated Circuit, Assembly Programming, 16-bit Microprocessor Architecture and Examples (8086-8088), Memory Structures, Addressing Modes, 16-bit Microprocessor Instruction Sets, Interrupt System, Input/Output Systems, Timers and Counters in 16-bit Microprocessors, Memory Management in 16-bit Microprocessors, Data Communication Protocols, System Design, Basic Structure of PIC Microcontrollers, Architecture and Memory Structure, PIC Microcontroller Development Environments, MPLAB X IDE and XC8 Compiler, PIC Programming Languages, Digital Input/Output and Basic Applications, Timer, Interrupt and PWM Usage, Analog/Digital Converter and Serial Communication, Microcontroller Based System Control Design Applications

EET3103 Electrical Machines-I (3 0 3) 4 ECTS

Magnetic field definitions; magnetic flux, magnetic flux density, magnetic field around a current-carrying conductor or a coil, right-hand rule, magnetic field intensity, magnetomotive force, reluctance, permeability. Hysteresis curve, magnetization curve. Magnetic circuits. Eddy currents, eddy current power loss, hysteresis power loss. Electromechanical energy conversion. Faraday's Law. Principles of voltage generation, determination of the polarity of generated voltage, generator operating principles. Force on a current-carrying conductor in a magnetic field, left-hand rule, motor operating principles. Classification of DC generators. Equivalent circuits of DC generators. DC generator characteristics. Voltage control in DC generators. Classification of DC motors. Equivalent circuits of DC motors. DC motor characteristics. Mechanical dynamics. Speed control methods in DC motors. Transformer operating principles, ideal transformer. Equivalent circuit of single-phase transformer. Phasor diagrams. Autotransformer. Efficiency, maximum efficiency, energy efficiency in transformers.

EET3104 Communication Systems (3 0 3) 4 ECTS

Devices of communication systems. Relationship between time and bandwidth. Energy and density of the power spectral. Fundamental signals, Fourier Transform, and features. Fourier series and harmonic synthesis. Electromagnetic waves and wavelength, frequency bands used in communication Linear modulation techniques, modulation requirement. Generation and demodulation of AM signals. Double side-band modulation, single side-band modulation. Angle modulation techniques: Phase and frequency modulation. Generation and demodulation of PM signals. Generation and demodulation of FM signals. Communication channels and distortion-free transmission. Superheterodyne receivers. Filters and filter design.

EET3105 Power Electronics-I (3-0-3) 4 ECTS.

Introduction to power electronics, Classification of power electronic converters. Basic semiconductor switches and Power Diodes. Transistor type semiconductor power switches. Thyristor type semiconductor power switches. Comparison of power switches. Driving circuits, power losses and heat sink design. Protection of power switches, snubber circuits. Introduction to AC/DC rectifiers, performance parameters. Operating principles of single and three-phase uncontrolled and controlled rectifiers and circuit analysis for different load conditions. Operating principles of single-phase thyristor AC/AC choppers and circuit analysis for different load conditions. Basic operating principles of DC/AC converters (inverters). Sinusoidal Pulse Width Modulation Technique.

EET3106 Energy Systems (3-0-3) 4 ECTS.

Overview of electric power generation, transmission and distribution systems. Electrical and mechanical structure of transmission lines. Conductors used in aerial lines. Considerations in the selection of conductor materials. R, L, C calculation in conductors. Ice load calculations. Deflection calculation and deflection methods. Cables. Poles. Classification of poles according to the material they are made of, the number of circuits they carry, line voltage and their duties. Pole calculations and selection. Insulators. Classification of insulators according to the material they are made of and their application. Potential distribution calculation in chain insulators. Disconnectors and breakers. Structural properties and classification. Busbars and busbar systems. Measurement transformers. Compensation. Grounding.

EET3107 Control Systems Laboratory (0-2-1) 2 ECTS

Utilization of MATLAB Control Systems Toolbox, Converting systems modeled with transfer functions and state-space equations using MATLAB Control Systems Toolbox, Analyzing system responses for various input signals, Reducing block diagrams in MATLAB, and examining the responses of reduced control systems for different input signals, Creating block diagram representations of control systems using MATLAB/Simulink, Investigating the time-domain characteristics of control systems with MATLAB, Determining the effects of P-I-D control and the design principles of PID controllers, Plotting root locus diagrams using the rlocus function and analyzing results, Conducting PID experiments with the Control Set, Performing PID experiments with the Pressure Set, Carrying out PID experiments with the Liquid Level Set, Executing PID experiments with the Temperature Set, Calibrating pressure sensors using the Calibration Set, Data exchange using Data Acquisition (DAQ) systems.

EET3108 Microprocessors Laboratory (0-2-1) 2 ECTS

Introduction and use of the experimental set. Assembly programming language. Assembly commands. LED burning applications for PIC16F877A microcontroller. PIC16F877A microcontroller time delay application. Introduction to registers in the PIC16F877A microcontroller. Use and application of 7-segment display with PIC16F877A microcontroller. Stepper motor application in PIC16F877A microcontroller. Forward-backward counter application in PIC16F877A microcontroller. ADC application in PIC16F877A microcontroller. RB0 external interrupt application in PIC16F877A microcontroller. TIMER0 applications in PIC16F877A microcontroller. PWM application in PIC16F877A microcontroller.

EET3109 Power Electronics Laboratory (0-2-1) 2 ECTS.

Introduction and use of MATLAB Power Electronics blocks. Diode and Thyristor characterization. Thyristor driving circuit design. IGBT and MOSFET driving circuit design. Snubber circuit for cut-off moment. Analysis of one-phase uncontrolled and controlled half/full wave rectifiers for R and RL and RC loads. Analysis of three-phase uncontrolled/controlled rectifiers for R and RL and RC loads. Analysis of one-phase AC-AC choppers for R and RL and RC loads. Analysis of one and three phase PWM inverter for R, RL and RC loads.

EET3110 Communication Systems Laboratory (0 2 1) 2 ECTS

Usage of power supply, Oscilloscope, Probes, Multimeter, and frequency meter. Usage of Signal Generator and Spectrum Analyzer. Wired communication line model Experiment. Harmonic Synthesis Experiment. AM Modulation and Demodulation Experiment. DSB and SSB Experiment. FM Modulation and Demodulation Experiment. Communication Matlab Toolbox applications. Digital Signal Transmission Experiment. Quadrate modulation Experiment. Phase Locked Loop (PLL) circuit Experiment.

EET3111 Signals and Systems (3 0 3) 4 ECTS

Classifications of signals: analog, digital, odd, even, continuous, periodic, energy, and power. Basic signals: unit step, unit impulse, complex exponential. Classification systems: storage and nonstorage system, causality, linearity. Stability, time invariance, feedback systems, and systems examples. Convolution integral in continuous time, features, step response, and the features of LTI systems. The identified systems with differential equations, and features. Convolution sum in discrete-time. The identified systems with differential equations, recursive solutions, impulse responses, and examples. Laplace transform, convergence region, pole and zero concept, Laplace transform of some basic signals. The features of Laplace transform, inverse Laplace transform, use of table, and partial fraction expansion. Inverse z-transform, use of z-transform table, power series expansion, partial fraction expansion, systems functions, examples. The Fourier series of periodic signals, Fourier transform, relation of Fourier and Laplace transform. Fourier transform features, Parseval's theorem. Filtering, filter types, bandwidth concept. Examination of different systems through examples of responses to different types of signals.

EET3112 Electrical Machines Laboratory (0 2 1) 2 ECTS

Current, voltage, coil resistance, power, motor speed and torque measurement experiments. Experimental obtaining of magnetization curve of DC generator. External, shunt, series and compound excited DC generator experiments. External, shunt, series and compound excited DC motor experiments. Experiments to determine turns ratio and polarity of transformer. No-load and short-circuit tests to determine equivalent circuit parameters of transformer. Experiments to determine load characteristics of transformer. No-load and short-circuit tests to determine steady state equivalent circuit parameters of asynchronous motor. Asynchronous motor loaded operation test. No-load and short-circuit operation tests of synchronous generator. Load operation tests of synchronous generator. Load operation tests of synchronous motor.

EET3113 Lighting Technique (3-0-3) 4 ECTS

The subject and purpose of lighting. Types of lighting and lighting fixtures. Photometric quantities (Luminous flux, amount of light, light intensity. Illumination level, photographic excitation, photometric radiance, glow. Photometric laws (Cosine law, Law of inverse proportion to the square of distances, Lambert law, Space angle projection law). Solving sample problems related to photometric laws. Components of lighting, Light and vision, basics of light production. Light sources (Incandescent lamps, arc lamps, discharge lamps), Making lighting calculations. Electrical interior installation materials. Electrical accidents and precautions that can be taken against them. Characteristics of 1/50 scale architectural application project to be provided, project materials. Classification of electrical interior installations, implementation of electrical interior installations during the construction phase of a building. Installation connection diagrams. Important articles of the Electrical Interior Installations Regulation. Drawing of electrical interior installation project of normal, ground and basement floors of a sample apartment building. Project control: Drawing of open and single line diagrams. Project control: Drawing of high current

column diagram. Preparation of table loading table. Fuse selection, selection of wire section, voltage drop calculation, voltage drop problems.

EET3114 Sensors And Measurement (3-0-3) 3 ECTS

Measurement principles, Static and dynamic characteristics of measuring instruments, Design criteria and label features of measuring instruments, Classification and calibration of measuring instruments, Various errors in measuring systems, Resultant error in measuring systems and its importance, Development of various algorithms related to DC measuring systems, Use of op-amp elements in measurements, Development of various algorithms related to AC measuring systems, System design for various electronic measurements, Digital systems and their adaptation to measuring systems, Various sensing elements and their use in measurements, Various analyzers.

EET3115 Renewable Energy Sources (3-0-3) 4 ECTS.

Energy types, definition of energy, classification of energy conversion systems. World and Turkey's energy resources and meeting the energy needs. Energy systems and environmental effects of energy use. Hydraulic (water, hydroelectric) energy production systems. Wind energy. Turkey's wind energy potential. Wind energy conversion systems, wind energy application areas. Solar energy and application areas. Solar cooling, photovoltaic cells and collectors. Biomass energy (biogas, bio fuels, organic waste energy). Biomass resources, biomass energy production. Geothermal energy and energy application systems, geothermal energy potential. Geothermal energy, geothermal fields and energy production systems. Marine (wave, tidal, etc.) energy, energy production systems. Hydrogen energy and hydrogen utilization. Microgrid and distributed power supply concept. Power electronic converters for renewable energy based microgrids. Energy storage systems for microgrids.

EET3116 Biomedical Electronics (3-0-3) 3 ECTS

Introduction to medical electronics. Basic idea of medical devices; sensors. Fundamentals of biopotential, electrical behavior of excitable cells. Examination of ENG, EMG, ECG, ERG, EEG and MEG. Measurement of blood pressure, measurement of blood flow and volume. Measurement of respiratory system. Clinical laboratory devices. Medical imaging systems. Therapeutic and artificial devices, heart rate regulator. Hemodialysis, kidney stone crushing systems. Surgical cutting devices. Electrical safety. Physiological effects of electricity, basic protection approach and protection against shock. Testing of electrical systems. Biotelemetry.

EET3117 Optoelectronics (3-0-3) 4 ECTS

Optoelectronics and related definitions, Basic optics, Wavelength of light, Photometry and Radiometry, Light, light-producing elements (Various lamps), Various lenses and lens structures, Optoelectronic sensors that detect light (Sensors/Detectors), Semiconductor Optical Sensors (Distance, Speed, Position, Distance, …), Various circuit applications with Semiconductor Optical Sensors, Light producing lasers, Various Optical Measurement System Designs (Distance, Speed etc.), Light converters (LDRs etc.), Electromagnetic (light) waves and their properties, Photovoltaics and their applications, Light transmitting devices (Optical fibers, semiconductor waveguides …), Advanced fiber optic systems.

EET3118 Electrical Machines-II (3 0 3) 3 ECTS

3-Phase power transformers and connection groups. Obtaining 1-phase equivalent circuit of 3-phase transformer. Determination of equivalent circuit parameters. 3-Phase asynchronous motors; introduction, structure and operating principles of asynchronous motor. Rotating magnetic field. Expression of rotating magnetic field. Slip and rotor speed. Slip-speed line in 3-phase asynchronous motor. Induced voltage and frequency in rotor. Rotor and stator equivalent circuits of 3-phase asynchronous motor. Steady state 1-phase equivalent circuit of 3-phase asynchronous motor. Approximate equivalent circuits used for asynchronous motor. Starting current and starting torque. Breakdown torque. Speed-torque characteristic of asynchronous machine. Power flow in asynchronous motor. Determination of equivalent circuit parameters of asynchronous motor; Determination of stator winding resistance, no-load and short circuit experiments. Usage areas, structure and operating principles of synchronous generator.

Induced 3-phase voltage and frequency in synchronous generator. Equivalent circuit and phasor diagrams of synchronous generator. Voltage regulation, armature reaction. Synchronous reactance and impedance. Generated power and torque. Open circuit and short circuit tests. Losses and efficiency calculation. Operating principles of synchronous motor. Loading and torque angle of synchronous motor. Adjustment of power factor by field change in synchronous motor. Starting in synchronous motor, damper winding. Generated power and torque angle characteristics. Phasor diagrams of synchronous motor. Efficiency calculation of synchronous motor, V and inverse V curves.

EET3119 Integrated Circuit Design (3-0-3) 4 ECTS

Basic integrated circuit building blocks. Current and voltage sources, biasing independent of supply voltage and temperature. Basic amplifier structures. Operational amplifiers; basic structures and basic performance parameters. Whole circuit oscillator structures. Analog multiplier circuits. Analog MOS building blocks; current sources, amplifier structures. Analog MOS building blocks; transconductance amplifiers (OTA). Analog MOS building blocks; current carriers. MOS analog multiplier circuits. MOS oscillators. D/A converters. A/D converters.

EET3120 Digital Control (3-0-3) 3 AKTS

Discrete-Time Signals and Systems, Discretization of continuous-time systems: forward, backward, and central difference methods, difference equations, Analysis of discrete-time systems and Z-transform, Transfer function, block diagram, and signal flow diagram in discrete-time systems, State diagrams and state equations in discrete-time systems, Characteristics and analysis of first- and second-order discrete-time systems, Stability analysis in discrete-time systems, Jury criterion, Steady-state analysis in discrete-time control systems, Sampling and hold process, Discrete-time PI, PD, and PID controllers, Analog-to-digital and digital-to-analog conversion methods, Digital controller design, Root locus-based analysis and design

EET3121 Professional Foreign Language (3-0-3) 4 ECTS

To measure students' ability to express themselves in English, to discuss some topics related to the profession in English. Cause-effect structures, adjective and noun clauses, conjunctions, passive sentences. English equivalents of the main technical terms used in the field of Electrical-Electronics. Reading passages related to Electrical-Electronics Engineering including professional topics to develop reading and comprehension skills. To comprehend English translation methods. Various applications; conductor, insulator and semiconductor. Mathematical terms in Electrical-Electronics engineering. Superconductivity. Electrical energy production. Dependent and independent voltage and current sources. Ohm's and Kirchhoff's laws. DC and AC electric motors, generators. Semiconductor switch technology. Operational amplifiers.

EET3122 Power Electronics-II (3-0-3) 4 ECTS.

Introduction to DC/DC converters, performance parameters, operating principles, applications and classification. One, two and four zone dc/dc converters. Operating principle of buck, boost, buck-boost and fly-back dc/dc converters and circuit analysis for different load conditions. Operating principles of three-phase thyristor AC/AC choppers and circuit analysis for different load conditions. Uninterruptible power supplies (UPS). Power Electronics Based Compensation, SVC and STATCOM.

EET3123 Computer Networks (3-0-3) 4 ECTS

Basic network concepts. Network hardware devices. Network layers. Application layer. Application layer examples. Socket programming techniques. Transport layer. TCP, UDP. Congestion Control Flow Control and protocols. Routing layer. IP, IP Routing protocols. IP Multicast, Mobility. Data Link layer, Ethernet. Link layer network.

EET3124 Industrial Electronics (3-0-3) 3 ECTS

General overview of industrial electrical subjects. Structures, operation, types and applications of sensors. SMPS circuits and applications. Single phase inverter. Methods for frequency and voltage control in inverter. Harmonic analysis, modulation index, frequency ratio. DC motor control. Asynchronous motor control. Synchronous machine control. Analysis and design of DC, AC and stepper motor driver circuits. Induction heating, induction furnaces. Uninterruptible power supplies. PLL applications.

EET3125 Filter Design (3-0-3) 4 ECTS

Filter types, low pass circuit functions. Hurwitz test, positive real functions. Time domain analysis, signal distortion, step and impulse responses. Butterworth, Chebyshev, Inverse Chebyshev and elliptic filters. Implementation of input functions. Canonical circuits, Foster and Cauer circuits. Frequency transformations. Zero shift, special poles. Active filters. General VCVS filters, biquad filters, higher order filters. Infinite gain multiple feedback band pass filters. Sensitivity, definitions and functions. Root sensitivity, variations. Introduction to digital filters and their types.

EET3126 Energy Management and Policies (3-0-3) 3 ECTS.

Introduction to Energy Policies and Basic Concepts. Types and Sources of Energy – Fossil Fuels. Types and Sources of Energy – Renewable Energy Sources. Energy Conservation and Management. Energy Security and Strategic Approaches. Energy Efficiency. Laws and Regulations Related to Energy Efficiency. Energy Management Policy. Energy Management System. General Energy Status of Turkey. Energy Investment Models. Development of the Electricity Market in Turkey. Energy Demand Forecasting Methods. Comparison of Energy Management Policies in Turkey and European Union Countries.

EET3128 Artificial Intelligence Techniques (3 0 3) 3 ECTS

Introduction; Basic Principles. Related Mathematics. Basic MATLAB Functions. Machine Learning. Artificial Neural Networks. Delta Learning Rule Training Multilayer Networks. Training Multilayer Networks. Classification with Artificial Neural Networks. Loss Functions. Deep Networks. Deep Learning. Convolutional Neural Networks. Applications of Convolutional Neural Networks

EET4101 Workplace Training (5-0-5) 5 ECTS

Implementing processes in public or private institutions in the workplace, developing skills and reinforcing knowledge.

EET4102 Workplace Training (5-0-5) 5 ECTS

Implementing processes in public or private institutions in the workplace, developing skills and reinforcing knowledge.

EET4103 Workplace Application (0-15-8) 15 ECTS

Implementing processes in public or private institutions in the workplace, developing skills and reinforcing knowledge.

EET4104 Workplace Application (0-15-8) 15 ECTS

Implementing processes in public or private institutions in the workplace, developing skills and reinforcing knowledge.

EET4105 Professional Practice- I (0-2-1) 5 ECTS

To provide students with the opportunity to increase their knowledge and experience regarding their diploma programs by observing the hierarchical responsibilities, relationships, organizational structure, work discipline in the workplaces they will work in order to reinforce the knowledge and experience they have gained during their education, by doing practice and by closely monitoring the functions performed by sector employees, To provide them with the ability to use the theoretical knowledge they have acquired and to transfer it to practice, To provide them with the habit of working in harmony with the personnel of the institution where they receive workplace training and of establishing good communication with other persons (customers or other institutions) related to the business, To ensure that they follow and recognize technological developments in the sector.

EET4106 Professional Practice-II (0-2-1) 5 ECTS

To provide students with the opportunity to increase their knowledge and experience regarding their diploma programs by observing the hierarchical responsibilities, relationships, organizational structure, work discipline in the workplaces they will work in order to reinforce the knowledge and experience they have gained during their education, by doing practice and by closely monitoring the functions performed by sector employees, To provide them with the ability to use the theoretical knowledge they have acquired and to transfer it to practice, To provide them with the habit of working in harmony with the personnel of the institution where they receive workplace training and to establish good communication with other persons (customers or other institutions) related to the business, To ensure that they follow and recognize the technological developments in the sector.

EET4107 Professional Practice-II (0-2-1) 5 ECTS

To provide students with the opportunity to increase their knowledge and experience regarding their diploma programs by observing the hierarchical responsibilities, relationships, organizational structure, work discipline in the workplaces they will work in order to reinforce the knowledge and experience they have gained during their education, by doing practice and by closely monitoring the functions performed by sector employees, To provide them with the ability to use the theoretical knowledge they have acquired and to transfer it to practice, To provide them with the habit of working in harmony with the personnel of the institution where they receive workplace training and to establish good communication with other persons (customers or other institutions) related to the business, To ensure that they follow and recognize the technological developments in the sector.

EET4109 Graduation Project (0-2-1) 3 ECTS

Project, research, experiment and observation, report preparation, etc. concepts. Determining the project topic, project proposal, creation. Project management (Planning, proposal, time management, cost). Implementation of the project work plan, documentation of the achieved results.

EET4110 Graduation Project (0-2-1) 3 ECTS

Project, research, experiment and observation, report preparation, etc. concepts. Determining the project topic, project proposal, creation. Project management (Planning, proposal, time management, cost). Implementation of the project work plan, documentation of the achieved results.

EET4111 Power Systems Analysis (3-0-3) 3 ECTS

Basic Concepts in Power Systems, Power Calculation in Three-Phase Circuits, Balanced Three-Phase Circuits, Single Line and Impedance Diagrams, Per-unit Values, Per-Unit Impedances of Transformers, Symmetrical Components, Solution of Unbalanced Three-Phase Systems with Symmetrical Components, Power in Symmetrical Components, Sequence Circuits of Impedance Loads, Generator and Motor Sequence Circuits, Faults in Power Systems, Investigation of Asymmetrical Faults in an Unloaded Generator, Investigation of Symmetrical Faults in an Unloaded Generator, Symmetrical Three-Phase Faults in Synchronous Machines

Stability in Power Systems

EET4112 Power Systems Analysis (3-0-3) 3 ECTS

Basic Concepts in Power Systems, Power Calculation in Three-Phase Circuits, Balanced Three-Phase Circuits, Single Line and Impedance Diagrams, Per-unit Values, Per-Unit Impedances of Transformers, Symmetrical Components, Solution of Unbalanced Three-Phase Systems with Symmetrical Components, Power in Symmetrical Components, Sequence Circuits of Impedance Loads, Generator and Motor Sequence Circuits, Faults in Power Systems, Investigation of Asymmetrical Faults in an Unloaded Generator, Investigation of Symmetrical Faults in an Unloaded Generator, Symmetrical Three-Phase Faults in Synchronous Machines

Stability in Power Systems

EET4113 Vision Systems (3-0-3) 5 ECTS

Introduction to television technology, conversion of image to electrical signal, video signal, analysis of video signal, coding of color image, NTSC, PAL and SECAM systems, semiconductor cameras, display elements, digital image compression standards, digital audio coding and transmission, digital television broadcasting, image formats in digital broadcasting: HDTV and SDTV, multiplexing of digital TV signals, encryption and restricted use systems, transmission of digital image and transmission protocols, television receivers.

EET4114 Vision Systems (3-0-3) 5 ECTS

Introduction to television technology, conversion of image to electrical signal, video signal, analysis of video signal, coding of color image, NTSC, PAL and SECAM systems, semiconductor cameras, display elements, digital image compression standards, digital audio coding and transmission, digital television broadcasting, image formats in digital broadcasting: HDTV and SDTV, multiplexing of digital TV signals, encryption and restricted use systems, transmission of digital image and transmission protocols, television receivers.

EET4115 Microwave Technique (3-0-3) 5 ECTS

Introduction to microwaves. Microwave elements. Electromagnetic theory. Transmission lines and waveguides. Impedance transmission and matching. Passive microwave devices. Electromagnetic resonators. Periodic structures and filters. Microwave resonators. Power dividers, directional couplers. Microwave filters. Active microwave circuits.

EET4116 Microwave Technique (3-0-3) 5 ECTS

Introduction to microwaves. Microwave elements. Electromagnetic theory. Transmission lines and waveguides. Impedance transmission and matching. Passive microwave devices. Electromagnetic resonators. Periodic structures and filters. Microwave resonators. Power dividers, directional couplers. Microwave filters. Active microwave circuits.

EET4117 Semiconductor Circuit Technology (3-0-3) 5 ECTS

Introduction to developments in microtechnology. Growth and preparation of semiconductor materials. Basic processes: Crystal cutting, oxidation, window opening, diffusion and epitaxy. Oxidation. Doping and type change. Diffusion, epitaxy and ion seeding. Structure and process of electronic components. Electrical isolation of integrated circuit elements. Collector-doped isolation. Silicon gate processing and load-coupled circuits. Metallisation, interconnection and bonding. Integrated circuit design-1. The future of semiconductor microtechnology.

EET4118 Semiconductor Circuit Technology (3-0-3) 5 ECTS

Introduction to developments in microtechnology. Growth and preparation of semiconductor materials. Basic processes: Crystal cutting, oxidation, window opening, diffusion and epitaxy. Oxidation. Doping and type change. Diffusion, epitaxy and ion seeding. Structure and process of electronic components. Electrical isolation of integrated circuit elements. Collector-doped isolation. Silicon gate processing and load-coupled circuits. Metallisation, interconnection and bonding. Integrated circuit design-1. The future of semiconductor microtechnology.

EET4119 Digital Signal Processing (3-0-3) 5 ECTS

Discrete-time signals and systems. Analog/Digital, Digital/Analog conversion and stages. Solution of linear constant coefficient difference equations. Z Transform, definition and region of convergence (ROC). Properties of the Z transform. Inverse Z transform and solution of linear constant coefficient difference equations using Z transform. Stability in discrete-time systems. Discrete-time system structures and frequency domain analysis of discrete-time signals. Discrete Fourier Transform (DFT), definition and properties. Discrete Time Fourier Transform (DFTF), definition and properties. Fast Fourier Transform (FFT), definition and properties. Digital filter design techniques. Infinite Time Impulse Response Filter (IIR) Design. Finite Time Impulse Response Filter (FIR) Design.

EET4120 Digital Signal Processing (3-0-3) 5 ECTS

Discrete-time signals and systems. Analog/Digital, Digital/Analog conversion and stages. Solution of linear constant coefficient difference equations. Z Transform, definition and region of convergence (ROC). Properties of the Z transform. Inverse Z transform and solution of linear constant coefficient difference equations using Z transform. Stability in discrete-time systems. Discrete-time system structures and frequency domain analysis of discrete-time signals. Discrete Fourier Transform (DFT), definition and properties. Discrete Time Fourier Transform (DFTF), definition and properties. Fast Fourier Transform (FFT), definition and properties. Digital filter design techniques. Infinite Time Impulse Response Filter (IIR) Design. Finite Time Impulse Response Filter (FIR) Design.

EET4121 Digital Communication (3-0-3) 5 ECTS

Current state of digital communication and future prospects. Digital communication elements. Basic communication mathematics. Overview of codec multiplexer and modem concepts. Analog/Digital conversion, Sampling, Quantization. Pulse code modulation (PCM). Digital baseband transmission. Line coding, Detection of baseband signals. Transmission through band-limited channels. Digital carrier modulation (ASK, FSK, PSK, QAM, QPSK, MSK, TCD and OFDM). Multiplexing and multiple access. Source coding, Channel coding, Matlab applications. Delta modulation and adaptive delta modulation, transmitter and receiver block diagrams, operating logic. Decision theory.

EET4122 Digital Communication (3-0-3) 5 ECTS

Current state of digital communication and future prospects. Digital communication elements. Basic communication mathematics. Overview of codec multiplexer and modem concepts. Analog/Digital conversion, Sampling, Quantization. Pulse code modulation (PCM). Digital baseband transmission. Line coding, Detection of baseband signals. Transmission through band-limited channels. Digital carrier modulation (ASK, FSK, PSK, QAM, QPSK, MSK, TCD and OFDM). Multiplexing and multiple access. Source coding, Channel coding, Matlab applications. Delta modulation and adaptive delta modulation, transmitter and receiver block diagrams, operating logic. Decision theory.

EET4123 Image Processing (3 0 3) 5 ECTS

Introduction; what is digital image ? Digital image processing concepts and application areas. Basic MATLAB Functions. Color Spaces. Image filtering. Spatial filters. Frequency domain filters. Image enhancement. Image segmentation. Color image processing. Color image segmentation. Morphological operations. Video processing.

EET4124 Image Processing (3 0 3) 5 ECTS

Introduction; what is digital image ? Digital image processing concepts and application areas. Basic MATLAB Functions. Color Spaces. Image filtering. Spatial filters. Frequency domain filters. Image enhancement. Image segmentation. Color image processing. Color image segmentation. Morphological operations. Video processing.

EET4125 Pattern Recognition (3-0-3) 5 ECTS

Introduction to pattern recognition. Decision theory. Supervised learning. Parametric methods. Dimension reduction. Clustering. Distance-based classifiers. Linear discrimination. Decision trees.

EET4126 Pattern Recognition (3-0-3) 5 ECTS

Introduction to pattern recognition. Decision theory. Supervised learning. Parametric methods. Dimension reduction. Clustering. Distance-based classifiers. Linear discrimination. Decision trees.

EET4127 Drive Systems and Control (3-0-3) 5 ECTS.

The mechanics of the drive systems, linear and circular motion. Force, torque, work, power, energy, mass, inertia, and friction. Mechanical connections. The speed-torque characteristics of the electric motors and machines. The general motion equation of the motor drive system. Braking for electric motors and types of the braking. Four-quadrant operation. Thermal equation of the electric motor. Selection criteria of motor. DC motor drive systems. PWM control techniques. Inverter-fed AC motor drive systems. Synchronous, brushless DC and switched reluctance motor drive systems. Selection of the motor drive. Open-loop and closed-loop systems.

EET4128 Drive Systems and Control (3-0-3) 5 ECTS.

The mechanics of the drive systems, linear and circular motion. Force, torque, work, power, energy, mass, inertia, and friction. Mechanical connections. The speed-torque characteristics of the electric motors and machines. The general motion equation of the motor drive system. Braking for electric motors and types of the braking. Four-quadrant operation. Thermal equation of the electric motor. Selection criteria of motor. DC motor drive systems. PWM control techniques. Inverter-fed AC motor drive systems. Synchronous, brushless DC and switched reluctance motor drive systems. Selection of the motor drive. Open-loop and closed-loop systems.

EET4129 Special Electric Machines (3-0-3) 5 ECTS

Single-phase induction motors, their structural characteristics and operating principles, Double Field Theory, characteristics and equivalent circuit models of single-phase motors. Stepper motors and driving circuits. DC and AC servo motors. Synchronous motors. Special type motors: reluctance, hysteresis, linear motors.

EET4130 Special Electric Machines (3-0-3) 5 ECTS

Single-phase induction motors, their structural characteristics and operating principles, Double Field Theory, characteristics and equivalent circuit models of single-phase motors. Stepper motors and driving circuits. DC and AC servo motors. Synchronous motors. Special type motors: reluctance, hysteresis, linear motors.

EET4131 High Voltage Technique (3-0-3) 5 ECTS

Fundamental equations of static electric fields. Electric field and potential calculation in planar, spherical, and cylindrical electrode systems. Examination of electrode systems for breakdown and economic aspects. Layered electrode systems. Refraction at boundary surfaces. Uniformly stressed cables and capacitor-type line insulators. Discharge phenomena. Ionization and its types. Channel discharge theory. Corona phenomenon in transmission lines and calculation of corona losses. Generation of high alternating voltages. Generation of high dc voltages. Generation of high impulse voltages, impulse generators, and their equivalent circuits. Overvoltages and their characteristics. Traveling waves and their calculation. Insulation coordination.

EET4132 High Voltage Technique (3-0-3) 5 ECTS

Fundamental equations of static electric fields. Electric field and potential calculation in planar, spherical, and cylindrical electrode systems. Examination of electrode systems for breakdown and economic aspects. Layered electrode systems. Refraction at boundary surfaces. Uniformly stressed cables and capacitor-type line insulators. Discharge phenomena. Ionization and its types. Channel discharge theory. Corona phenomenon in transmission lines and calculation of corona losses. Generation of high alternating voltages. Generation of high dc voltages. Generation of high impulse voltages, impulse generators, and their equivalent circuits. Overvoltages and their characteristics. Traveling waves and their calculation. Insulation coordination.

EET4133 Energy Transmission and Distribution (3-0-3) 5 ECTS.

Obligations of Transmission and Distribution Networks, Classification of Electric Networks According to Distribution Types, Energy Transmission Lines, Network Line Constants, Switchyard and transformer center equipment, Overhead Line Conductors and Underground Cables, Poles, Traverses, Consoles, Insulators, Low voltage networks and distribution transformers.

EET4134 Energy Transmission and Distribution (3-0-3) 5 ECTS.

Obligations of Transmission and Distribution Networks, Classification of Electric Networks According to Distribution Types, Energy Transmission Lines, Network Line Constants, Switchyard and transformer center equipment, Overhead Line Conductors and Underground Cables, Poles, Traverses, Consoles, Insulators, Low voltage networks and distribution transformers.

EET4135 Robotics (3-0-3) 5 ECTS

Fundamental Concepts in Robotics, Kinematics in Robotics, Differential Kinematics in Robotics, Statics in Robotics, Trajectory Planning, Actuators, Sensors, Control Architectures, Dynamics.

EET4136 Robotics (3-0-3) 5 ECTS

Fundamental Concepts in Robotics, Kinematics in Robotics, Differential Kinematics in Robotics, Statics in Robotics, Trajectory Planning, Actuators, Sensors, Control Architectures, Dynamics.

EET4137 Automatic Control (3-0-3) 5 ECTS

System and control concepts, classification of physical systems. Deriving mathematical models of physical systems. Principle of analogy and applications for modeling systems in different energy modes. Open-loop and closed-loop systems and their characteristics. General control problems. Transfer functions. Block diagrams, signal flow diagrams. State variables analysis. Stability of linear control systems. Time response analysis of control systems. Root Locus Plot. Frequency domain analysis of control systems. PID controller design using the Ziegler-Nichols method.

EET4138 Automatic Control (3-0-3) 5 ECTS

System and control concepts, classification of physical systems. Deriving mathematical models of physical systems. Principle of analogy and applications for modeling systems in different energy modes. Open-loop and closed-loop systems and their characteristics. General control problems. Transfer functions. Block diagrams, signal flow diagrams. State variables analysis. Stability of linear control systems. Time response analysis of control systems. Root Locus Plot. Frequency domain analysis of control systems. PID controller design using the Ziegler-Nichols method.

EET4139 Mechatronic Systems (3-0-3) 5 ECTS

Mechatronic system design procedure, system modeling and simulation, sensor and transducer selection, driver system component selection, mechanical component selection, microprocessor/microcontroller selection, mechatronic system design examples.

EET4140 Mechatronic Systems (3-0-3) 5 ECTS

Mechatronic system design procedure, system modeling and simulation, sensor and transducer selection, driver system component selection, mechanical component selection, microprocessor/microcontroller selection, mechatronic system design examples.

EET4141 Data Acquisition and Control Systems (3-0-3) 5 ECTS

Hardware of data acquisition systems, structure and operation of data acquisition and control cards (DAQ). Analog input, analog output circuits and their characteristics. Digital input/output, counter/timer. Sensors and actuators. Signal conditioning hardware. Computers and data acquisition card setup. Improving measurement quality, precision and accuracy. Noise minimization. Sensor and adc value compatibility. Data acquisition software, driver software and application software. Input range, gain, and precision relationship in daq cards. The term scada. Programming and application of data cards.

EET4142 Data Acquisition and Control Systems (3-0-3) 5 ECTS

Hardware of data acquisition systems, structure and operation of data acquisition and control cards (DAQ). Analog input, analog output circuits and their characteristics. Digital input/output, counter/timer. Sensors and actuators. Signal conditioning hardware. Computers and data acquisition card setup. Improving measurement quality, precision and accuracy. Noise minimization. Sensor and adc value compatibility. Data acquisition software, driver software and application software. Input range, gain, and precision relationship in daq cards. The term scada. Programming and application of data cards.

EET4143 Industrial Automation Systems (3-0-3) 5 ECTS

Fundamentals of control systems, control circuit elements, general standards related to control circuits. Programmable logic controllers (PLC), advantages over classical control systems, PLC structure, units, PLC operating system, execution of PLC user program, programming methods, PLC selection criteria, PLC programming, industrial applications for PLC. Scada systems, Industrial communication systems, Industrial network topologies.

EET4144 Industrial Automation Systems (3-0-3) 5 ECTS

Fundamentals of control systems, control circuit elements, general standards related to control circuits. Programmable logic controllers (PLC), advantages over classical control systems, PLC structure, units, PLC operating system, execution of PLC user program, programming methods, PLC selection criteria, PLC

programming, industrial applications for PLC. Scada systems, Industrial communication systems, Industrial network topologies.

EET4145 Communication Electronics (3 0 3) 4 ECTS

Communication Systems. Resonant circuits. Impedance matching circuits. Power amplifiers. Class C power amplifiers. High-frequency amplifiers. Amplitude and frequency response of amplifiers. Tuned amplifiers. Wideband amplifiers. Basic amplitude modulated transmitter circuits. Basic frequency modulated receiver circuits. Phase locked cycle (PLL). Examining linear PLL. PLL applications.

EET4146 Communication Electronics (3 0 3) 4 ECTS

Communication Systems. Resonant circuits. Impedance matching circuits. Power amplifiers. Class C power amplifiers. High-frequency amplifiers. Amplitude and frequency response of amplifiers. Tuned amplifiers. Wideband amplifiers. Basic amplitude modulated transmitter circuits. Basic frequency modulated receiver circuits. Phase locked cycle (PLL). Examining linear PLL. PLL applications.

EET4147 Electric Vehicle Systems (3-0-3) 5 ECTS.

Historical developments of electric vehicles. The importance of electric vehicle according to energy and environment. Electric vehicle architecture, power transmission in electric vehicle. DC/DC converters used in electric vehicle. DC/AC converters used in electric vehicle. Design of electric vehicle. Energy storage systems and design of energy storage systems for electric vehicles. Battery management systems. Fundamentals of regenerative braking. Design of energy management system in electric vehicles. Integration of electric vehicle and smart grid. Modelling and control of electric vehicle and analyzing of MATLAB simulation results.

EET4148 Electric Vehicle Systems (3-0-3) 5 ECTS.

Historical developments of electric vehicles. The importance of electric vehicle according to energy and environment. Electric vehicle architecture, power transmission in electric vehicle. DC/DC converters used in electric vehicle. DC/AC converters used in electric vehicle. Design of electric vehicle. Energy storage systems and design of energy storage systems for electric vehicles. Battery management systems. Fundamentals of regenerative braking. Design of energy management system in electric vehicles. Integration of electric vehicle and smart grid. Modelling and control of electric vehicle and analyzing of MATLAB simulation results.

EET4149 Protection in Power Systems (3-0-3) 5 ECTS

Ensuring the continuity and safety of an operation by protecting power systems against internal and external influences, the fundamental principles of protection, protection using fuses in Low Voltage (LV) and High Voltage (HV) systems, relays and their characteristics, overcurrent relay, protection with impedance relay and differential relay, generator, line, transformer, and motor protection, relay coordination, overvoltage protection schemes, the structure, operating principles, and selection of surge arresters, protection lines, and trip intervals.

EET4150 Protection in Power Systems (3-0-3) 5 ECTS

Ensuring the continuity and safety of an operation by protecting power systems against internal and external influences, the fundamental principles of protection, protection using fuses in Low Voltage (LV) and High Voltage (HV) systems, relays and their characteristics, overcurrent relay, protection with impedance relay and differential relay, generator, line, transformer, and motor protection, relay coordination, overvoltage protection schemes, the structure, operating principles, and selection of surge arresters, protection lines, and trip intervals.

EET4151 Electric Power Plants (3-0-3) 5 ECTS.

Methods of Electricity Generation. Thermal Power Plants. Nuclear Power Plants. Renewable Energy Power Plants. Hydroelectric Power Plants. Faults in Power Plants. Selection of Protection Equipment in Power Plants.

EET4152 Electric Power Plants (3-0-3) 5 ECTS.

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EET4154 Wireless Communication (3-0-3) 5 ECTS

Introduction: Amplification and attenuation, fundamental antenna parameters. Propagation Loss and Noise: Propagation loss, thermal noise, noise temperature, noise figure, link margin, link budget analysis. Electromagnetic Propagation: Reflection, refraction, diffraction, scattering. Narrowband Fading Models: Two-path channel model, Rayleigh fading model, Rician fading model, Nakagami-m fading model, fading margin, Doppler spectrum, level crossing rate, average fading duration. Wideband Fading Models: Log-normal distribution, Suzuki model, fading margin. Statistical Wideband Channel Modeling: Inter-symbol interference, multipath dispersion: two-path model, multipath scattering channels, frequency-selective channels, deterministic time-variant channel modeling. Standard Channel Models: Narrowband channel models (deterministic and statistical approaches), wideband channel models (tapped delay line model, exponential model, COST 207 model). Demodulation in Fading Channels: Extended signal space representation. Diversity Techniques: Correlation coefficient, spatial-temporal, frequency, and other diversity techniques. Multiple Access Techniques: Multiplexing and multiple access, FDM/A, TDM/A, performance comparison of FDMA and TDMA, cellular networks, frequency reuse, and cell planning. Fundamentals of OFDM: Transmitter-receiver architecture, frequency-selective channels, and cyclic prefix. GSM Systems: Air interface, logical and physical channels, call establishment and handover. Wi-Fi Systems: OFDMA-based local area networks.

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