T.C.
FIRAT ÜNİVERSİTESİ
KEBAN MESLEK YÜKSEKOKULU MÜDÜRLÜĞÜ

ELECTRICAL ENERGY GENERATION TRANSMISSION AND DISTRIBUTION PROGRAM
COURSE PLANS AND COURSE CONTENTS

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T.R.
FIRAT UNIVERSITY
KEBAN VOCATIONAL SCHOOL
ELECTRICAL ENERGY GENERATION,
TRANSMISSION AND DISTRIBUTION PROGRAM

COURSE PLANS

1ST CLASS FALL SEMESTER						
Course Code	**Course Name**	**O*/E***	**T***	**P***	**C***	**ECTS***
TRD109	Turkish Language I	O	2	0	2	2
YDİ107	English I	O	2	0	2	2
MAT103	General Mathematıcs	O	2	0	2	3
KED101	Circuit Analysis I	O	3	0	3	5
KED103	Measurement Technique I	O	1	2	2	4
KED105	Technical Drawing	O	1	2	2	4
KED107	Basic Electronics	O	1	2	2	4
ENF101	Use Of Basic Information Technologies	O	2	2	3	4
FU 101	Introduction To University Life	O	2	0	2	2
Total			**16**	**8**	**20**	**30**

***O:** Obligatory, **E:** Elective, **T:** Theoretical, **P**: Practice, **C:** Credit, **ECTS:** European Credit Transfer System.

1ST CLASS SPRING SEMESTER						
Course Code	**Course Name**	**O*/E***	**T***	**P***	**C***	**ECTS***
TRD110	Turkish Language II	O	2	0	2	2
YDİ108	English II	O	2	0	2	2
TBİ102	Scientific Principles Of Technology	O	2	0	2	3
KED102	Professional Mathematics	O	2	0	2	4
KED104	Circuit Analysis II	O	3	0	3	4
KED106	Measurement Technique II	O	1	2	2	4
KED108	Electrical Machines I	O	1	2	2	4
KED110	Wind Power Plants	O	3	0	3	4
	Elective Course (*)					
Total			**18**	**4**	**20**	**30**
ELECTIVE COURSES (*)						
KED112	Alternative Energy Sources	E	2	0	2	3
KED114	Occupational Health And Safety	E	2	0	2	3

* It is obligatory to choose one of the elective courses.

2ND CLASS FALL SEMESTER						
Course Code	**Course Name**	**O*/E***	**T***	**P***	**C***	**ECTS***
AİT209	Ataturk's Principles And History Of Revolution I	O	2	0	2	2
KED201	Digital Electronics	O	3	0	3	3
KED203	Lighting And Project	O	1	2	2	4
KED205	Energy Transmission And Distribution	O	3	0	3	3
KED207	Hydroelectric Power Plants	O	3	0	3	3
KED209	Electrical Machines II	O	2	2	3	3
KED211	High Voltage Technique	O	2	0	2	3
KED213	Vocational Practice	O	0	2	1	6
	Elective Course (*)					
Total			**18**	**6**	**21**	**30**
ELECTIVE COURSES (*)						
KED 215	Programmable Controllers	E	2	0	2	3
KED 217	Entrepreneurship	E	2	0	2	3

* It is obligatory to choose one of the elective courses.

2ND CLASS SPRING SEMESTER						
Course Code	**Course Name**	**O*/E***	**T***	**P***	**C***	**ECTS***
AİT210	Ataturk's Principles And History Of Revolution II	O	2	0	2	2
KED202	Power Electronics	O	1	2	2	3
KED204	Protection İn Electrical Facilities	O	2	0	2	3
KED206	Control Systems And Application	O	1	2	2	4
KED208	Solar Energy Technology	O	3	0	3	4
KED210	Specially Designed Motors	O	2	0	2	3
KED212	Thermal Power Plants	O	3	0	3	4
KED214	Graduation Project	O	0	2	1	4
Total			**16**	**6**	**19**	**30**
ELECTIVE COURSES (*)						
KED216	Natural Gas Power Plants	E	2	0	2	3
KED218	Scada Systems	E	2	0	2	3

* It is obligatory to choose one of the elective courses.

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COURSE CONTENTS

COURSES (TERM I)	O/E	T	P	C	ECTS
TRD109 Turkish Language I	**O**	**2**	**0**	**2**	**2**
Language, languages, Turkish Language, grammar, phonetic features of Turkish, phonetic and structural features of Turkish, structural features of Turkish, sentence knowledge, spelling rules and punctuation marks, application of spelling rules, application of punctuation marks.					
YDİ107 English I	**O**	**2**	**0**	**2**	**2**
Verb Be, statements and questions, countries and nationalities, present simple tense, statements, verbs for daily routines, present simple questions, free time activities, verb Have / Has, family tree, there is / there are, places in a town, present continuous tense, rooms and furniture, can / can't, months of the year, present simple tense, present continuous tense, jobs.					
FU101 Introduction Of Unıversıty Lıfe	**Z**	**2**	**0**	**2**	**2**
Areas of responsibility, city and campus promotion, student societies and movements, career center, departments, life on campus, career planning and time management, personal care and hygiene, healthy life and sports, disaster and emergencies and management, first aid, written and verbal communication, traffic and environmental awareness, academic title ranking and consultancy, domestic and international higher education and student mobility, quality policies, college activities, project information, student projects, student affairs automation, distance education, continuing education center, disciplinary affairs, regulations, directives and senate decisions, grading system, course passing, mobile technologies, short film techniques.					
MAT103 GENERAL MATHEMATICS	**O**	**2**	**0**	**2**	**3**
Ability to perform arithmetic and algebraic operations. Ability to calculate the power and root of a real number. Solution of radical, fractional equations and equations that can be converted to second degree. Real and complex numbers, equations of the second degree with one unknown. Root coefficient relations in second degree equations and solutions of inequalities. Solving equations and inequalities. Using trigonometric ratios. Understanding complex numbers. Solution of determinant and linear equations, equation of a line in the plane, vectors, logarithms.					
ENF101 Use of Basic Information Technologies	**O**	**2**	**2**	**3**	**4**
Computer architecture. Motherboard, processor, monitor, keyboard, RAM, ROM, hard disk, printer, serial-parallel port, usb. CD-ROM, sound card, floppy, software concept and types; programming languages; operating systems. Ability to perform basic functions in Windows and Linux operating systems. Ability to use office programs at a basic level. Use of e-mail management and e-commerce. Loading, updating, deleting programs. Ability to write technical texts and draw graphics. Ability to use office devices and convert formats between them. Ability to create formats such as photographs, documents, etc. using scanners, dockers, network cameras, etc. Ability to recognize modems, printers, Ethernet and SSCI cards, sound cards, and TV cards. Ability to create a new computer by combining all hardware of the computer. Computer networks and communication. Creating a database. Creating an e-mail address, sending and receiving e-mails. Preparing a personal website.					
KED101 Circuit AnalysisI	**O**	**3**	**0**	**3**	**5**
Circuit elements and theorems. Kirchhoff's Laws, Series-Parallel Resistance Circuits. Circuit Topology. Delta-Star Transformation. Loop Current Method. Nodal Point Method. Superposition Method. Thevenin Equivalent Circuits. Norton Equivalent Circuits. Work and power calculations in electric circuits. Independent and dependent sources. Behavior of circuits with coils and capacitors in direct current.					
KED103 Measurement Technique I	**O**	**1**	**2**	**2**	**4**
Classification and introduction of measuring instruments according to their working principles. Measurement errors. Rotary coil galvanometer and its applications. Direct current, Direct voltage and resistance measurement. Extension of the measurement limits of measuring instruments. Alternating current measurements. Effect of frequency on AC measurements, Electrodynamic measuring instrument. Moving iron measuring instrument. AC current measurements. Definitions of active power, reactive power, Wattmeters. Energy meter. Calorimetric power instrument. Bolometer. Resistance types and color codes.					
KED105 Technical Drawing	**O**	**1**	**2**	**2**	**4**
In technical drawing; line types, norm text and types. Polygon drawings, view extraction. Perspective drawings. 2D drawing and scaling in AutoCAD. Projection drawings in computer environment. Drawing applications with professional symbols.					
KED107 Basic Electronics	**O**	**1**	**2**	**2**	**4**
Structure of semiconductors. Diodes, Transistors, FETs, amplifiers. Rectifier circuits. Establishment of regulated circuits. Using Transistor as Switching Element, Transistor Amplifier Circuits. Establishing electronic control and command circuits.					
COURSES (TERM II)	**O/E**	**T**	**P**	**C**	**ECTS**
TRD110 Turkish Language II	**O**	**2**	**0**	**2**	**2**
Reading with comprehension and pleasure, acquiring the habit of reading, evaluating the text read, written expression, limiting a subject, making plans on this subject, writing sentences as paragraphs, written expression techniques and their application, introduction and application of written expression types, preparation of scientific review articles, verbal expression, ways to be successful in oral expression, forms and application of oral expression, types and application of oral expression.					
YDİ108 English II	**O**	**2**	**0**	**2**	**2**
Past simple, verb be, events and places to go, past simple actions, school subjects, past simple questions, parts of the body, future tense, be + going to, travel, countable and uncountable nouns, foods, clothes, weather, adjectives, comparatives adjectives, superlatives adjectives, geographical features.					
TBİ102 Scientific Principles of Technology	**O**	**2**	**0**	**2**	**3**
Unit systems. Vectors. Static forces, Moment, Friction. Motion. Newton's laws of motion. Work, Power, Energy. Momentum, conservation. Hydrostatics, Hydrodynamics.					
KED102 Professional Mathematics	**O**	**2**	**0**	**2**	**4**
Being able to understand complex numbers. Solution of Determinant and Linear Equations, Line Equation in the Plane, Vectors, Logarithm. Coordinate systems. Partial derivatives and exact differentials in functions of several variables.					
KED104 Circuit AnalysisII	**O**	**3**	**0**	**3**	**4**

Instant, average, peak and effective values Sinusoidal current and voltage, phasors, impedance. Frequency domain analysis of alternating current circuits. Power and power factor in alternating current circuits. Application of loop and node methods in alternating current circuits. Application of circuit theorems in alternating current circuits.					
KED106 Measurement TechniqueII	**O**	**1**	**2**	**2**	**4**
Capacitors. Impedance, resistance, self and capacitance measurement at low frequencies. Measurement of circuit elements at high frequencies. Introduction of the oscilloscope. Digital devices. Sound frequency measurements. Sensors and Transducers.					
KED108 Basic Electronics I	**O**	**1**	**2**	**2**	**4**
To be able to understand the structure and working principle of D.A. Machines. To be able to understand the starting and speed control methods of D.A. Machines. Electrical braking methods in motors. Being able to calculate equivalent circuit and efficiency in transformers. Being able to recognize different connection groups in three-phase transformers.					
KED110 Wind Power Plants	**O**	**3**	**0**	**3**	**4**
Wind power plants. Wind turbines and types. Wind power plant elements. Electric energy production in wind power plants. Types of alternators used. wind power plant design; rotor aerodynamics; feasibility studies in electricity generation from wind energy; design of combined diesel-wind energy systems. Wind energy, wind energy potential, wind energy map in Turkey.					
KED112 Alternative Energy Sources	**E**	**2**	**0**	**2**	**3**
Introduction of wave, geothermal, biogas, biomass, hydrogen and nuclear energy sources, Preparation of systems using these sources for Turkey's conditions examination of their usability and project planning principles.					
KED114 Occupational Health and Safety	**E**	**2**	**0**	**2**	**3**
The concept of occupational safety, the economic importance of occupational safety studies, employer and employee duties and responsibilities, the Occupational Health and Safety Law No. 6331, definition of occupational accidents, causes and prevention methods, fire and fire extinguishing methods, occupational health and safety in hand tools, physical, chemical, biological risks, hazards and types of hazards, methods and solutions in accident investigations, occupational health and safety application principles, appropriate job placement, evaluation of workplace environmental factors, analysis of occupational health and safety risks, periodic control examination, basic first aid information, occupational diseases and legal liability, emergency plans. Environmental risk assessment methods and calculations.					
COURSES (TERM III)	**O/E**	**T**	**P**	**C**	**ECTS**
AİT209 Ataturk's Principles And History Of Revolution I	**O**	**2**	**0**	**2**	**2**
Definitions of the terms revolution and history, world revolutions and the place of the Turkish revolution within them, characteristics of the Turkish revolution, Armenians under the Ottoman Empire, The Ottoman Empire in I. World War and the results of the war, the Armistice of Mudros and the occupation of the Empire, the beginning of the War of Independence, Atatürk's place and goal in the War of Independence, the Amasya circular, National congresses, Istanbul-Anatolia relations, the opening and first works of the Turkish Grand National Assembly, internal rebellions prevention, wars on the Eastern front, national fronts (National Forces), Western front, the first international agreements made by the Turkish Grand National Assembly, the Lausanne Peace Treaty.					
KED201 Digital Electronics	**O**	**3**	**0**	**3**	**3**
Analog and digital concepts, binary, octal, decimal, hexadecimal number systems and conversions. 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 Karnough diagram, "it doesn't matter" 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.					
KED203 Lighting and Project	**O**	**1**	**2**	**2**	**3**
Basic principles in lighting. Light sources and lighting types. Electrical Installation Elements. Weak and high current installation diagrams. Voltage drop calculation and section selection in lighting and motor feeds. Drawing of interior installation projects.					
KED205 Energy Transmission and Distribution	**O**	**3**	**0**	**3**	**3**
Reasons for using high voltage in energy transmission, medium and high voltage conductors, used in overhead lines insulator and its selection, equivalent circuits of short, medium and long lines, ohmic, inductive and capacitive loading conditions of transmission lines, double circuit and bundle conductor lines, losses in transmission lines, poles and their selection, conductor cross-section calculation in energy transmission and distribution.					
KED207 Hydroelectric Power Plants	**O**	**3**	**0**	**3**	**3**
Definitions, history, classification, water wheels, water turbines, algebra pipe, theory, Euler equations, hydraulic power and efficiency, structure of Pelton turbine, speed triangles, power and efficiency relations, Francis turbines, classification, structure of turbine, parts, power and efficiency expressions, diffuser, diffuser efficiency, Kaplan and Uskur turbines, structures, differences between them, power and efficiency expressions, characteristic curves, cavitation in water turbines, causes, prevention solutions, hydroelectric power plants, special turbines, pipe turbine, Banki turbine.					
KED209 Electrical Machines II	**O**	**2**	**2**	**3**	**4**
To be able to recognize the structure of AA machines, three-phase and single-phase asynchronous motors, To understand their features and areas of use. To understand the starting, speed control and braking methods of three-phase asynchronous motors and their equivalent circuits. Single-phase AC motors. Structure and operating principle of synchronous machines. Operation as a generator. Poles and pole excitation systems. Parallel operation and synchronization. Active and reactive load adjustment. Operation as a motor. Voltage regulators.					
KED211 High Voltage Technique	**O**	**2**	**0**	**2**	**3**
Overvoltages. Static Electric Field. Basic electrode systems. Puncture phenomenon. Electric field and potential calculation in planar, spherical and cylindrical electrode systems. Approximate calculation of maximum electric field. Layered electrode systems. Fracture at boundary surfaces. Uniformly stressed cable and capacitor bushings. Discharge phenomena in gases, liquids and solids. Ionization. Discharge theories. Traveling waves and their calculations. Insulation coordination.					
KED213 Vocational Practice	**O**	**0**	**2**	**1**	**6**
Preparation and presentation of the internship, examination of the prepared internship notebook and evaluation with questions.					
KED215 Programmable Controllers	**E**	**2**	**0**	**2**	**3**
PLC's basic technology, PLC units, PLC interface program, writing programs with Ladder diagram, using sequential function block programs, Programming the operator panel / touch panel, operating the pneumatic circuit with PLC, operating the hydraulic circuit with PLC, controlling the motor with PLC.					
KED217 Entrepreneurship	**E**	**2**	**0**	**2**	**3**
Information on entrepreneurship, self-knowledge of the entrepreneur, testing of entrepreneurial characteristics, innovation and invention, business idea development and creativity exercises, (brainstorming), starting a business, business plan concept and elements (market research, marketing plan, marketing techniques, making promotions with the right tools, production plan, management plan, financial plan), studies to consolidate the business plan elements (market research, marketing plan, production plan, management plan, financial plan), points to be considered in writing and presenting the business plan, filling out KOSGEB documents.					

COURSES (TERM IV)	O/E	T	P	C	ECTS
AİT210 Ataturk's Principles And History Of Revolution II	**O**	**2**	**0**	**2**	**2**
Declaration of the Republic, the first constitution, Atatürk's principles and revolutions (revolutions in social, economic, administrative, cultural and other fields), Turkey and the world states during the period of single-party governments, the Republican period, internal rebellions, the foreign policy of the Government of the Republic of Turkey, treaties, the Orient and the Armenian issue, attempts at transition to the multi-party era, Ataturk's death, II. World War and Turkiye, developments in Turkiye's foreign policy, the Middle East and the Republic of Turkiye, Turkiye's principles and goals in the period of rapid progress.					
KED202 Power Electronics	**O**	**1**	**2**	**2**	**3**
Power electronics circuit elements. Triggering principles, controlled rectifiers. A.C. switches and adjusters. D.C. switches and adjusters. Direct frequency converters. Frequency inverters. Protection in power electronic circuits.					
KED204 Protection in Electrical Installations	**O**	**2**	**0**	**2**	**3**
Basic principles of protection and protection relays. Generator, transformer and line protection. Protection against overvoltages. Warning systems in hydroelectric power plants.					
KED206 Control Systems and Application	**O**	**1**	**2**	**2**	**4**
Control circuit elements; contactors, thermal elements, limit switches, relays, their features and operating principles. Motor control circuits; drawing of start, stop, braking, direction change, starting, speed control circuits and their connections. Hydraulic-Pneumatic control elements; valves, pressure switches, their symbols, features and operating principles. Hydraulic-Pneumatic control circuit connections.					
KED208 Solar Energy Technology	**O**	**3**	**0**	**3**	**4**
Structural Properties of the Sun. Solar Radiation. Sun angles, radiation meters. Solar Energy. Solar Energy Systems. Energy Balance in Solar Collectors. Solar Pool. Solar Architecture. Cooling with Solar Energy. Soil Solarization. Electricity Production from Solar Energy, Introduction of Solar Energy Apparatus, Examination and Design of Solar Panels.					
KED210 Specially Designed Motors	**O**	**2**	**0**	**2**	**3**
Single-phase induction motors, structural features and operating Fundamentals, Dual Field Theory, characteristics and equivalent circuit models of single phase motors. Stepper motors and their drive circuits. DC and AC servo motors. Special types of motors; reluctance, hysteresis, linear motors.					
KED212 Thermal Power Plants	**O**	**3**	**0**	**3**	**4**
Energy Conversion, Power Cycles, Power generation from fossil fuels, Thermal Power Plants. Installation characteristics of steam turbines. Washing, rotation, lifting, electrical leakages and arrangements of turbine rotor. Measurement devices for specific heat consumption of turbines and arrangement of their locations and calculation of specific heat consumption. Regulation and characteristics. Start-up and shutdown of turbines and turbine failures. Turbine tests. Matters to be considered in ordering turbines. Cogeneration systems. Thermodynamic and economic analysis of thermal power plants. Environmental effects of thermal power plants.					
KED214 Graduation Project	**O**	**0**	**2**	**1**	**4**
Choosing the study topic, Presenting the information obtained, Defining the functions and variables of the System/Product, Selecting the necessary materials, Presenting the information obtained, Preparing the specification or flow chart of the System/Product, Making the program or calculations of the System/Product, Establishing the environment in which the System/Product will operate, Installing the System/Product, Testing the System/Product, Presenting the outputs of the System/Product in the form of a report.					
KED216 Natural Gas Power Plants	**E**	**3**	**0**	**3**	**4**
Natural Gas and properties, comparison with other fuels. Gas turbines, Gas turbine tests. Natural gas combined cycle power plants, temperature and pressure control. Load transfer					
KED218 Scada Systems	**E**	**2**	**0**	**2**	**3**
Computerized Data Acquisition and Control Understanding the basic principles and principles of software (SCADA), program development techniques using SCADA software and communication with PLC.					

Note: A 30-day internship is required during the spring semester summer term of the first year.