

## ELECTRICAL ENGINEER

(name of the programme)

Eil. No.	Parameters	Notes
1.	<b>Title of learning programme</b>	Electrical engineer
2.	<b>General information</b>	
2.1.	<b>Relevance of the learning programme</b>	The Electrical Engineer and Electromechanics curriculum is designed to provide an introduction to electrical engineering systems, their operation, and their application in today's world of science, engineering and technology.
2.2.	<b>Aim and objectives</b>	<p>The aim of the programme is to provide practical knowledge and skills in electrical instruments, wiring, reading and practical connection of schematics, occupational safety, connection of electrical machinery and instruments, principles of operation of measuring instruments, possibilities of use and practical application, as well as the introduction of new technologies and instruments into practice.</p> <p>Objectives:</p> <ul style="list-style-type: none"> <li>• Be able to prepare wires and cables for connection to each other and to electrical circuits by interconnecting them together and in practical diagrams.</li> <li>• Be able to connect electrical measuring instruments and correctly measure electrical quantities. Know which instrument to select for correct measurement.</li> <li>• Identify the types of electric motors and be able to connect, start and operate them according to the diagrams given.</li> <li>• To be able to draw and read electrical schematics, to draw and understand the meanings of electrical symbols, to understand the meanings of symbols and their practical application, to select the correct elements in practical schematics.</li> <li>• Know how to start and operate electric motors and understand their electromechanical properties.</li> <li>• Know and understand the significance of electrical measurements, and select circuit elements according to the results of measurements.</li> <li>• Understand the principles of electrical-automatic devices and be able to select them correctly.</li> </ul>
2.3.	Duration of the learning programme:	150
2.3.1.	Duration of practical contact work Academic hours	96
2.3.2.	Duration of theoretical contact work Academic hours	54
2.3.3.	Duration of self-study Academic hours	Not applicable

2.4.	Minimum requirements for participation (if applicable):	Basic education.
2.5.	Method(s) of teaching the learning programme:	
2.5.1.	Curriculum blended learning	-
2.5.2.	Learning programme Teaching method Distance learning synchronous	-
2.5.3.	Learning programme teaching method contact	Contact (auditory)
2.6.	System/scale for assessing acquired competences	Credited / Not credited
2.7.	<b>Learning Programme Annotation</b>	This training programme is designed for those who want to acquire the theoretical knowledge and practical skills to work with electrical systems and their operation and application in today's world of science, engineering and technology.
<b>3.</b>	<b>Competences acquired or developed in a learning programme:</b>	
	<b>Competence(s)</b>	<b>Means of assessing the competence(ies) developed and/or acquired in the programme</b>
3.1.	General competences	
	Communicate using professional terms.	Not evaluated
	Collect, process and store the information you need for your work.	Not evaluated
	Organise your learning.	Not evaluated
3.2.	Professional competences	
	Prepare wires and cables for interconnection in electrical circuits by connecting them together and in practical diagrams.	Credited / not credited
	Identify the types of electric motors and be able to connect, start and operate them according to the diagrams given.	Credited / not credited
	Know how to draw and read electrical schematics.	Credited / not credited
	Know how to start and operate electric motors and understand their electromechanical properties.	Credited / not credited
	Know and understand the significance of electrical measurements, and select circuit elements according	Credited / not credited

	to the results of measurements.				
	Understand the principles of electrical-automatic devices and be able to select them correctly.	Credited / not credited			
<b>4. Learning programme content and methods</b>					
	<b>Eil. No.</b>	<b>Title of topic</b>	<b>Brief description of the topic</b>	<b>Methods of teaching (training)</b>	<b>Competences to be acquired/improved</b>
	1.	<b>Introduction</b>	Introduction to applied electrical engineering	Informative (imparting, consolidating and testing knowledge), Practical Operational (building knowledge and skills), Creative (developing a reflective and creative personality) Oral: explanation and lecture; Practical: demonstration and observation and exercises; Visual: practical work.	Know the latest developments, achievements and problems in Lithuanian and world electrical engineering.
	2.	<b>Safety at work</b>	<ul style="list-style-type: none"> <li>• Technical requirements for safety.</li> <li>• Requirements for a safe workplace for electricians.</li> <li>• Electrical safety basics.</li> <li>• Sanitary and hygienic working conditions</li> </ul>		List the requirements for safe working in the laboratory. Give first aid. Prepare the workplace. List the fire safety requirements in a laboratory.
	3.	<b>Wiring and connection</b>	<ul style="list-style-type: none"> <li>• Preparation of wires and cables for connection.</li> <li>• Soldering and pressing.</li> <li>• Connecting wires with disassembled and non-disassembled splices.</li> <li>• Wiring.</li> <li>• Electrical and insulating materials.</li> </ul>	Informative (imparting, consolidating and testing knowledge), Practical Operational (building knowledge and skills), Creative (developing a reflective and creative personality) Oral: explanation and lecture; Practical: demonstration and observation and exercises; Visual: practical work.	List the electrician's tools. Prepare wires and cables for connection to circuits Differentiate between electrical conductors and dielectrics.
	4.	<b>DC circuits and their connection</b>	<ul style="list-style-type: none"> <li>• Connection of DC circuits, elements of circuits, measurement of current and voltage in circuits, measuring instruments and their connection methods, principles of operation of measuring instruments.</li> </ul>		Understand the principle of resistance and rheostat operation. Learn how to connect a voltmeter, ammeter and wattmeter in circuits. Understand the influence and operation of the

			<ul style="list-style-type: none"> <li>• Capacitor influence in DC circuits, principles of operation.</li> </ul>		capacitor in DC circuits. Learn to connect resistors in series, parallel, star, triangle.
5.	<b>AC circuits and their connection</b>	<ul style="list-style-type: none"> <li>• Alternating current, differences from direct current.</li> <li>• Practical applications of AC power.</li> <li>• Elements of AC circuits, how they are connected in circuits, their purpose.</li> <li>• Selection of wire and cable cross-sections for electrical circuits.</li> <li>• Understanding phase and linear voltage and current.</li> </ul>	Informative (imparting, consolidating and testing knowledge), Practical Operational (building knowledge and skills), Creative (developing a reflective and creative personality) Oral: explanation and lecture; Practical: demonstration and observation and exercises; Visual: practical work.	Understand the fundamental differences between direct current and alternating current. Understand what voltages can be present in a network, recognise the colours of AC wires and cables and the markings on diagrams. Understand how cables are connected in single-phase and three-phase networks. Understand what is phase and linear voltage and current.	
6.	<b>DC motors</b>	<ul style="list-style-type: none"> <li>• DC motors, their types, method of connection to a DC voltage source.</li> <li>• Checking the motor to assess whether it is suitable for connection and operation.</li> <li>• Engine speed control and direction of rotation.</li> </ul>		Be able to identify and distinguish between motors and motor types by the type of inductor (rotor). Understand how windings are connected in a motor and learn how to measure winding resistances. Learn how to determine whether or not the motor windings are shorted. Learn how to determine whether a motor is suitable for connection to a circuit.	
7.	<b>Single-phase asynchronous motors</b>	<ul style="list-style-type: none"> <li>• Single-phase asynchronous motors, their types (capacitor or</li> </ul>	Informative (imparting, consolidating and testing knowledge),	Learn to distinguish between engines. Understand how windings are	

			excitation winding) and the method of connection to an alternating voltage source. <ul style="list-style-type: none"> <li>• Reversing the direction of rotation of the engines.</li> <li>• Engine disassembly.</li> </ul>	Practical Operational (building knowledge and skills), Creative (developing a reflective and creative personality) Oral: explanation and lecture; Practical: demonstration and observation and exercises; Visual: practical work.	connected in a motor, their purpose, and how to measure winding resistance. Learn how to determine whether a motor is suitable for connection to a circuit. Understand the principle and structure of an engine.
8.	<b>Transformers</b>	<ul style="list-style-type: none"> <li>• Transformers and their working principle, purpose, winding idling, electromotive force.</li> <li>• Real transformers, their parameter measurements.</li> </ul>	Understand the principle, design and practical applications of a transformer.		
9.	<b>Three-phase motors</b>	<ul style="list-style-type: none"> <li>• Three-phase synchronous and asynchronous motors. Understanding the wiring diagram.</li> <li>• Starting three-phase asynchronous motors from 3-phase and 1-phase power supplies.</li> <li>• Selecting the elements to run a synchronous and asynchronous motor.</li> <li>• Triangle and star motor connection.</li> <li>• Backstopping of motors.</li> <li>• Adjusting the rotation of the motor with a frequency converter in the laboratory.</li> </ul>	Learn to distinguish between synchronous and asynchronous motors. Learn to read principle and structural diagrams and connect them in the laboratory. Understand the design and operation of engines. Learn to connect three-phase motors in star and triangle. Learn how to connect motors to phase 3 and phase 1 networks. Understand the effect of capacitors on motor starting. Understand the importance and purpose of relays and contact starters for connecting and starting		

					asynchronous motors.
	10.	<b>The electrical system in your apartment or house.</b>	<ul style="list-style-type: none"> <li>• Switches, sockets, installation, purpose.</li> <li>• Selection of panels and their elements, installation of panels.</li> <li>• Lighting transformers, their selection.</li> <li>• Rules for the installation of the indoor electrical network.</li> <li>• Maintenance of the electrical wiring of the premises.</li> <li>• Installation of outlets and inlet cabinets in residential houses and apartment blocks.</li> <li>• Rules for the construction of flaps.</li> <li>• Requirements for the installation and operation of the installation and operation of the control cabinets.</li> <li>• Installation of lighting wiring.</li> <li>• Lighting lamps and luminaires, their installation and operation.</li> <li>• Selection and installation of automatic transfer switches.</li> <li>• Control and protection equipment for lighting installations</li> <li>• Differential current protection and its selection in lighting and power installations.</li> </ul>	Informative (imparting, consolidating and testing knowledge), Practical Operational (building knowledge and skills), Creative (developing a reflective and creative personality) Oral: explanation and lecture; Practical: demonstration and observation and exercises; Visual: practical work.	Learn how to connect the lighting network in an apartment or residential building, select automatic protectors, install elements in a panel, and mark wires.

<b>5. Learning programme plan</b>					
	<b>Eil. No.</b>	<b>Title of topic</b>	<b>Hours to be allocated</b>		
			<b>Total</b>	<b>For theoretical teaching</b>	<b>For practical training</b>
	1.	Introduction	2	2	0
	2.	Safety at work	4	2	2
	3.	Wires and their connection	6	2	4
	4.	DC circuits and their connection	20	7	13
	5.	AC circuits and their connection	20	7	13
	6.	DC motors	20	7	13
	7.	Single-phase asynchronous motors	20	7	13
	8.	Transformers	10	4	6
	9.	Three-phase motors	28	9	19
	10.	The electrical system in your apartment or house.	20	7	13
	<b>Total</b>		150	54	96
<b>6.</b>	<b>Relevance of the acquired/improved competence to the competence(ies) for the relevant qualification(s) set out in the relevant occupational standard (if the relevant occupational standard is adopted)</b>		Not applicable		
<b>7. Preparing for non-formal adult education and training</b>					
<b>7.1. Requirements for those delivering the Learning Programme:</b>					
	1.	Qualification as an electrician or a degree in electrical engineering or equivalent, or at least 3 years' professional experience as an electrician or automation technician.			
<b>7.2. A detailed description of the material and methodological resources required for the training, corresponding to the number of participants to be trained and to the aims and objectives of the programme.</b>					
	<b>Eil. No.</b>	<b>The resources used in the teaching process:</b>			
	1.	Training facilities	A classroom or other room equipped with technical means (computer, video projector) for presenting teaching/learning material.		
	2.	Equipment	A classroom (room) for practical training, equipped with work clothes, personal protective equipment, hand-held, hand-held power, tools, measuring instruments, work benches, fasteners.		
	3.	Sources of training	<ul style="list-style-type: none"> <li>• Textbooks and other educational material</li> <li>• Occupational safety and health legislation</li> <li>• Rules for the use and maintenance of tools and equipment</li> </ul>		
	4.	Other measures	<ul style="list-style-type: none"> <li>• Technical tools to illustrate and visualise teaching/learning materials</li> </ul>		

			<ul style="list-style-type: none"><li>• Visual aids, layouts, samples, catalogues</li><li>• Technology cards</li><li>• Personal protective equipment</li></ul>
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