

1.1 Description of the intended learning outcomes

1.2 Course title: ELECTRICAL ENGINEERING (Annex No. 1 to the Regulation No. 33/11/12) Level of studies: 1st cycle of higher education (BSc programme) Profile of studies: general academic		
Learning outcomes for the field of Electrical Engineering Code	Field of study learning outcomes	Reference to learning outcomes for the area of technical sciences
KNOWLEDGE		
K1A_W1	The graduate has ordered knowledge in the field of the basics of logic, linear algebra and analytical geometry, differential and integral calculus and its applications	T1A_W01
K1A_W2	The graduate has knowledge in the field of physics, including mechanics, thermodynamics, optics, electricity and magnetism, nuclear physics and solid state physics	T1A_W01
K1A_W3	The graduate knows the principles of programming and designing algorithms for solving engineering tasks, he/she knows appropriate information tools	T1A_W01 T1A_W02 T1A_W07
K1A_W4	The graduate knows the principles of numerical solving of algebraic and differential equations, including algorithms and information tools	T1A_W01 T1A_W07
K1A_W5	The graduate knows the principles of engineering graphics enabling solving technical problems in the field of electrical engineering and mechanics	T1A_W02 T1A_W07
K1A_W6	The graduate has detailed knowledge of DC and AC circuit theory as well as basic laws of electrical engineering, understands the occurrence of steady and transient states, knows the properties of electric circuit elements	T1A_W02 T1A_W03
K1A_W7	The graduate knows the theory of electromagnetic field in application to electrical engineering	T1A_W02 T1A_W03
K1A_W8	The graduate has elementary knowledge in the field of materials used in electrotechnical industry	T1A_W02 T1A_W03 T1A_W07
K1A_W9	The graduate has knowledge of units of measurement, the principles of designing an experiment and conducting tests, documenting the measurement results and calculating the uncertainty of the obtained results	T1A_W02 T1A_W04
K1A_W10	The graduate knows the theoretical basis of operation and modelling of electrical machines, drive systems and mechatronic systems as well as their industrial applications	T1A_W02 T1A_W05 T1A_W06 T1A_W07
K1A_W11	The graduate knows the theoretical basis of construction and operation of electronic (analog, digital, microprocessor, microcontroller) elements and systems as well as power electronics elements and systems	T1A_W02 T1A_W07

K1A_W12	The graduate knows the principles of using measuring apparatus and properties of basic measuring instruments as well as the principles of operation of measuring systems	T1A_W03 T1A_W04 T1A_W05
K1A_W13	The graduate knows automation, regulation and control systems, understands stability problems in dynamic systems and knows the methods of their description	T1A_W03 T1A_W04 T1A_W05
K1A_W14	The graduate knows the principles of power system operation, understands the issues related to generation, transmission and distribution of electricity, knows the construction of devices and elements of a power system, understands their mutual dependencies and environmental impact	T1A_W03 T1A_W04 T1A_W05 T1A_W06
K1A_W15	The graduate knows the principles of safe maintenance of electric devices and installations, including legal aspects, as well as knows and understands the design rules of protection installations	T1A_W08
K1A_W16	The graduate has basic knowledge concerning management, including quality management, and running a business, understands the principles of entrepreneurship and understands the principles of a market economy	T1A_W09 T1A_W11
K1A_W17	The graduate knows the basics of the use of copyright and intellectual property protection, is able to use patent information resources	T1A_W10
K1A_W18	The graduate knows typical engineering technologies in the field of electrical engineering	InzA_W05
SKILLS		
1) general skills (unrelated to the field of engineering education) T1A_U01÷06		
K1A_U1	The graduate can obtain information from literature, databases and other sources, including those in English; is able to integrate the obtained information, interpret it, and draw conclusions as well as formulate and justify opinions	T1A_U01
K1A_U2	The graduate can communicate using various techniques in a professional environment and in other environments	T1A_U02
K1A_U3	The graduate can develop documentation of realization of an engineering task and prepare a text containing a discussion of realization results of this task	T1A_U03
K1A_U4	The graduate can prepare and deliver a short presentation on the results of realization of an engineering task	T1A_U03 T1A_U04
K1A_U5	The graduate has the ability of self-education, i.a. to improve professional competencies	T1A_U05
K1A_U6	The graduate uses English in a sufficiently comprehensible way to communicate and read technical literature, according to the requirements of level B2 of the Common European Framework of Reference of Languages	T1A_U01 T1A_U06
2) basic engineering skills T1A_U07÷12		
K1A_U1	The graduate can present the obtained results in numerical and graphical form, interpret them and draw correct conclusions	T1A_U07

K1A_U2	The graduate can plan and perform a simulation and make measurements of electrical and mechanical characteristics and parameters, as well as perform extraction of basic quantities characterizing electric materials, elements and devices	T1A_U07 T1A_U08
K1A_U3	The graduate can use appropriately selected tools of the computer-aided design, simulators and programming environments for simulation, design and verification of electric elements and circuits as well as simple electric systems	T1A_U07 T1A_U08 T1A_U09
K1A_U4	The graduate can formulate an algorithm, is able to use programming languages and appropriate information tools	T1A_U07 T1A_U09
K1A_U5	The graduate can formulate an algorithm, is able to use low-level and high-level programming languages and appropriate information tools for programming microcontrollers or	T1A_U07 T1A_U09
K1A_U6	The graduate can use appropriately selected methods and measuring instruments enabling measurement of basic quantities characterizing electric elements and systems	T1A_U08
K1A_U7	The graduate can use the knowledge of physics and mathematics for analysis of operation and design of electric systems and devices	T1A_U09
K1A_U8	The graduate can compare design solutions of electric systems and devices in terms of given utility and economic criteria	T1A_U09 T1A_U12
K1A_U9	The graduate can, when formulating and solving tasks concerning design of electric systems and elements, recognize their non-technical aspects, including environmental, economic and legal ones	T1A_U10
K1A_U10	The graduate applies the principles of work safety and occupational hygiene in maintenance of electric devices	T1A_U11
K1A_U11	The graduate can perform a preliminary economic analysis of undertaken engineering tasks	T1A_U12
3) skills directly related to solving engineering tasks T1A_U13÷16		
K1A_U1	The graduate can compare and assess existing technical solutions, in particular electric subsystems, devices and systems	T1A_U13
K1A_U2	The graduate can assess simple insulation systems in terms of quality and sufficiency	T1A_U09 T1A_U13
K1A_U3	The graduate can identify and formulate the specification of simple, practical engineering tasks	T1A_U14
K1A_U4	The graduate can assess the usefulness of routine methods and tools for solving simple engineering tasks, typical for electrical engineering, as well as choose and apply proper methods and tools	T1A_U15
K1A_U5	The graduate can carry out calculations of simple power circuits in normal and disturbance states	T1A_U09 T1A_U15
K1A_U6	The graduate can design a simple control and regulation circuit	T1A_U16
K1A_U7	The graduate is able to design electric circuits and systems with use of appropriate methods, techniques and tools when taking into account the given utility and economic criteria	T1A_U12 T1A_U16

K1A_U8	The graduate can design a simple drive circuit	T1A_U16
K1A_U9	The graduate can analyze and select elements of simple power electronic circuits	T1A_U16
K1A_U10	The graduate can select parameters of simple elements of a power circuit and design electrical installations	T1A_U09 T1A_U10 T1A_U16
K1A_U11	The graduate can design and construct a simple measuring system	T1A_U16
K1A_U12	The graduate can carry out calculations of parameters of electrical machines	T1A_U16
SOCIAL COMPETENCIES		
K1A_K1	The graduate understands the need and knows the possibilities for continuous self-improvement and development of professional, personal and social competencies	T1A_K01
K1A_K2	The graduate is aware of importance and understands non-technical aspects and effects of engineering activity, including its influence on the environment, as well as the related responsibility for the decision taken	T1A_K02
K1A_K3	The graduate is aware of the responsibility for own work and is ready to comply with the rules of team work and to accept the responsibility for the tasks performed collectively	T1A_K03
K1A_K4	The graduate can properly identify priorities for realization of a task determined by himself/herself or others	T1A_K04
K1A_K5	The graduate is aware of importance of behaving in a professional way, complying with the rules of professional ethics	T1A_K05
K1A_K6	The graduate can think and act in an enterprising way	T1A_K06
K1A_K7	The graduate is aware of a social role of the graduate of university of technology; understands the need of formulating and sharing with the society information and opinions concerning achievements of technology and other aspects of engineering activities; does his best to communicate such information and opinions in a comprehensive way	T1A_K07