KLAIPĖDA STATE UNIVERSITY OF APPLIED SCIENCES

Faculty of Technologies

STUDY PROGRAMME: **ELECTRICAL AND AUTOMATION ENGINEERING**
NAME OF THE SUBJECT: **ELECTRICAL POWER ENGINEERING**
CODE OF THE SUBJECT: **TF – EA – 2 – 019**

Group of the subject*	Type of the subject**	Form of studies	Structure***				Total number of hours	Number of credits
			T	P	C	I		
SF	P	Full-time studies (FT)	26	12	3	39	80	3
		Part-time studies (PT)	10	6	25	39		

*Group of the subject: GS – general study subjects; SF – subjects of the study field.
**Type of the subject: C – compulsory subject; A – optional subject (alternative).
***Structure: T – theory; P – seminars, workshops, laboratory works; C – consultations; I – individual work.

Annotation

The aim of the subject is to provide knowledge about the primary equipment belonging to the system of electrical power engineering, designed for generation, transmission, distribution and consumption of electric energy. Here production of power sources, construction and principles of operation of high and low voltage electrical network elements, purpose of electric power substations, as well as constructions and schemes will be analysed. Theoretical and practical abilities to perform calculations of electrical network elements will be formed. Students will also obtain knowledge about calculations of normal and emergency operating conditions of networks.

The connection of results of the study programme with results of the study subject and study methods, as well as evaluation methods of the learning achievements

Results of the study programme	Results of the study subject	Study methods	Evaluation methods of the learning achievements
2.1. A student is able to perform analysis of problems, related to electronics and electrical engineering, to analyse engineering tasks and conditions for the operation of equipment that is used for the generation and distribution of electricity.	2.1.1. A student is able to select and apply standards of EU energetics and technical normative documents.	Lecture, analysis of normative documents and group work.	Defence of workshops (4, 5) and examination in writing.
	2.1.2. A student knows methods of electricity generation, schemes and parameters of electrical network, construction of high and low voltage equipment and principles of their operation.	Lecture, discussions, workshops, theoretical modelling, study of the educational material in "Moodle" virtual learning environment.	Defence of workshops (6) and examination in writing.
3.2. A student understands devices and systems of electrical engineering, as well as applies mathematical methods and software.	3.2.1. A student is able to assess operational peculiarities of transmission and distribution network, and to select and calculate parameters and characteristics by using mathematical methods and standard software.	Lecture, group work, case analysis, solving of practical tasks and discussions.	Defence of workshops (7), a test (1-5), defence of an individual work and examination in writing.
5.1. A student is able to select technical means for the installation and operation of electricity and automated systems, as well as coordination of	5.1.1. A student knows basics for calculation and design of power stations, substations, electrical networks and parameters and conditions of power consumers.	Lecture, group work, case analysis, solving of practical tasks and discussions.	Defence of workshops (8), a test (6-8), defence of an individual work and examination in writing.

theoretical and applied knowledge by solving problems, related to electronics and electrical engineering.			

Contents and scope of the subject

Topic name and content description	Number of the contact hours, FT form			Number of the contact hours, PT form			I	Total number of hours
	T	P	C	T	P	C		
1. Structure and principle of operation of electricity system, as well as marking of system's elements in the schemes. EU standards, normative regulations. The use of software ArcGIS in electrical power engineering. Map making of transmission and distribution networks of Lithuanian regions and their analysis.	2	2	0	2	1	1	4	8
2. The purpose of power stations and their primary types. Thermal, nuclear, hydroelectric and wind power stations. Evaluation of opportunities for development of wind and small hydroelectric power stations by using software ArcGIS technologies. An individual work. Map making and analysis of Lithuanian wind power stations.	4	2	0	2	1	3	6	12
3. Elements of electrical networks. Commutation apparatus of high and low voltage. Power and measuring transformers	3	1	1	1	1	3	4	9
4. **Schemes and construction of transformer substations and switch-yards. Auxiliaries of power stations.**	2	0	0	0	0	2	4	6
4. Overhead and cable lines of electricity. Constructions and calculations of primary parameters. The use of network's database for identification of parameters of lines and transformers. Workshop No 1**.** Calculation of parameters of overhead and cable lines.	4	1	0	1	0	4	4	9
5. Calculation of voltage, power and energy losses in lines and transformers. Calculation of transmission network and loop network. Workshop No 2. Calculation of voltage, power and energy losses in the lines and power transformers.	3	1	0	1	1	2	3	7
1 Test (1-5 topics).	0	1	0	0	1	0	0	1
6. Emergency conditions of electrical networks. Calculations of short-circuit currents. Workshop No 3. Calculation of short-circuit currents in high-voltage networks.	2	1	1	1	0	3	2	6
7. Relay protection and automation of electric systems. Workshop No 4. Calculation of settings of relay protection devices.	4	1	0	1	0	4	4	9
8. Reactive power compensation.	2	1	0	1	0	2	3	6

Workshop No 5. Calculation of parameters of reactive power installations.								
Test No 2 (6-8 topics).	0	1	0	0	1	0	0	1
Preparation for the examination	0	0	1	0	0	1	5	6
Total number of hours	**26**	**12**	**3**	**10**	**6**	**25**	**39**	**80**

Assessment system of results of the subject studies

Result number of the study subject	**Assessment criteria of results of the study subject**
X1	
2.1.1. 2.1.2.	Knowledge of the primary terms and definitions of the study subject and ability to apply them in practice. Quality of performed practical tasks, provision of solutions and their reasoning.
3.2.1.	Ability to calculate operating conditions of transmission and distribution network by using mathematical methods and standard software. Quality of performed practical tasks.
5.1.1.	Absorption of knowledge, set out in the subject results. Validity of rationality of the provided solutions. Identification of problems, provision of solutions during workshops and their reasoning.
X2	
2.1.1. 2.1.2. 3.2.1. 5.1.1.	Quality of performance and presentation of practical works. Application of results of the study subject in a certain situation. Knowledge about the elements belonging of the system of electrical power engineering, principles of their performance and knowledge of functionality of their primary parameters.
Procedure of evaluation	
A ten-point criterial grading system and cumulated grading are applied. $\mathbf{IKV = 0.5X_1 + 0.5X_2}$ $\mathbf{X_1}$ – grading average of 2 tests (50%), 5 workshops (10%) and 2 individual works (40%); $\mathbf{X_2}$ – grading of examination.	

Recommended literature and other information sources

Primary literature and information sources			
No	**Literature and information sources**	**Number of copies**	
		At the library of the Faculty of Technologies	**At other libraries of Klaipeda State University of Applied Sciences**
1.	Deksnys R., Staniulis R., Miškinis V. (2010). *Elektrinių ir pastočių elektrinė dalis.* Technologija, Kaunas.	4	-
2.	Musial. E. *Elektros energetiniai įrenginiai ir instaliacija.* .Kaunas, Šviesa, 2001.	10	-
3.	Navickas A. (2007). *Elektros energetikos sistemų patikimumas.* Technologija, Kaunas.	4	-
4.	Svinkūnas G., Navickas A. (2014, 2011). *Elektros energetikos pagrindai*. Technologija, Kaunas.	25	-
5.	Šatas J. (2006). *Įmonių elektros įrenginiai ir tinklai*. KU leidykla, Klaipėda.	25	-
Additional literature and information sources			
No	**Literature and information sources**		
1.	*Elektros įrenginių įrengimo bendrosios taisyklės (2012).* Energetika, Vilnius.		
2.	Isoda G. (2008). *Elektros technologijos žinynas.* Energetikų mokymo centras, Vilnius.		
3.	Bailyss C. J., Hardy B., J. (2007). *Transmission and distribution electrical engineering.* Oxford, Elsevier.		

Description of the subject was prepared by:

Associate Professor		Dr Liudmila Andriušienė
(*Position*)	*(Signature)*	*(Academic degree, name and surname)*