АНОТАЦІЯ НАВЧАЛЬНОЇ ДИСЦИПЛІНИ

Назва показників	Характеристика
Повна назва дисципліни	Fundamentals of Electronic, Electrical Equipment
Викладацький склад	Prof. Korytchenko Kostyantyn Volodymirovich
Спеціальність	185 Oil and Gas Engineering_and_Technology
Освітня програма	required professional training
Кількість годин	90
Кредити ECTS	3
Опис	The course "Fundamentals of Electronics, Electrical Equipment" is special (professional) for engineering education, including for the field of production and technology, chemical technology and bioengineering. It orients students in the flow of modern scientific and technical information, prepares students to master special disciplines and develops skills that help to further solve engineering problems using electrical approaches, electrical and electronic devices in modern conditions, and in modern fields of science, technology and industries in which studentsspecialize.
	Мета вивчення дисципліни – the formation of students; competencies and learning outcomes in the field of electrical engineering and electronics, by providing them with a base of theoretical and practical training.
	Результати навчання полягають у наступному: Understanding the general principles of selection of control and automation of technological processes in the oil and gas industry. Choose effective means of control and automation of technological processes in the oil and gas industry, taking into account the goals and existing constraints
	Методи навчання Lecture. The lecture uses different techniques of oral presentation of information: maintaining attention for a long time, activating the thinking of students; techniques that provide logical memorization: beliefs, arguments, proofs, classification, systematization, generalizations, etc.
	The method of discussion of educational material and discussion is used at lectures and practical classes. Discussion allows you to significantly deepen and systematize knowledge, understanding of a particular problem, to check the basis of the conclusions reached by students during the study of specific topics. The discussion method develops in them the ability to defend their views and beliefs. The discussion helps to identify, logically and critically understand the different perspectives, scientific concepts and approaches to the issues under consideration. The organization and support of the discussion is achieved

through the use of the following techniques: formulation
of questions (basic, additional guidance, etc.), discussion
of students; answers and opinions, adjustment of answers
and formulation of conclusions
Visual and practical teaching methods. Illustrative teaching methods include illustration and display. Illustration - showing students posters, cards, graphics, sketches on the board. Demonstration of lecture materials by multimedia.
Practical classes. The method used in preparing and performing laboratory work is: do as I do. In discussing the results obtained from laboratory work, the method of sequential assimilation of the material throughout the discussion is used.
required
5 semester pass

ЗМІСТ НМКД

No		Наявність скла	адової НМКНД
3/П		Електронний	Друкований
	Складова НМКНД	файл на сайті	варіант в
		кафедри/посилання	ĤМКД
1	2	3	4
1	Титульний аркуш	+	+
2	Анотація навчальної дисципліни	+	+
3	Робоча навчальна програма	+	+
4	Конспект лекцій	+	+ *
5	Методичні вказівки/рекомендації до		
	практичних, лабораторних, семінарських	+	+
	занять		
6	Навчально-методичні матеріали до		
	самостійної роботи студентів.	+	+
	Індивідуальні завдання.		
7	Навчально-методичні матеріали для		
	проведення практики	+	+
8	Методичні вказівки/рекомендації до		
	виконання курсової роботи (проєкту),	+	+
	розрахунково-графічної роботи		
9	Методичні вказівки/рекомендації до		
	виконання бакалаврських випускних та		
	магістерських кваліфікаційних робіт		
10	Комплекс задач поточного та	1	1
	підсумковому контролю	Т	T
11	Модульні контрольні роботи (за		
	наявністю) у вигляді переліку		
	теоретичних питань та типових завдань	+	+
	для розв'язку, з яких формуватимуться		
	індивідуальні завдання		
12	Перелік питань до заліку/екзамену з	+	+
	дисципліни		-
13	Екзаменаційні білети, якщо екзамен		
	передбачено навчальним планом		
14	Комплексна контрольна робота (ККР),		
15	ректорська контрольна (РКР)		
15	Перелік навчально-методичної, наукової		
	фахової літератури, періодичних видань,		
	електронних ресурств, що можуть бути	+	+
	використані для опанування дисципліни		
	та не були наведені в робочи програмі		
16			
10	перелік засобів інформаційного,		
	візуального та програмного заоезпечення		
*	дисциплини		• ``
Паперс	овии варіант виготовляється у випадку службо	овоі неоюхідності (ліцензув	ання, акредитація тощо).

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL TECHNICAL UNIVERSITY KHARKIV POLYTECHNIC INSTITUTE

Department <u>Department Applied Electrical Engineering</u> (the name of the department providing the teaching of the discipline)

"APPROVED"

Head of the department	<u>Department Applied Electrical Engineering</u>
(name of the department)	

Korytchenko Kostyantyn Volodymirovich (signature) (full name)

"____" ____ 2021

THE EDUCATIONAL SUBJECT WORKING PROGRAM Fundamentals of Electronic, Electrical Equipment

(title of the educational subject)

higher education leve	elfirst	
C	first (bachelor's) / second (master's)	
field of knowledge_		
	(code and name)	
specialty	185 Oil and Gas Engineering and Technology	
specially	(code and name)	
educational program	Oil and Extraction	
	(names of education programs/ specialty)	
type of subject	required professional training	
	(general training / professional training; required / optional)	
0 0 1		
form of education	<u>full time</u>	
	(full-time / part-time/ distance)	

Kharkiv - 2021

APPROVAL LIST

the educational subject on working program_<u>Fundamentals of Electronic</u>, Electrical Equipment_

(title of the subject)

Developers:

Head of Department		
Applied Electrical Engineering,		
Dr. of techn. sciences, Prof		K.V. Korytchenko
(position, academic degree and academic title)	(signature)	(full name)
Dr. of techn. sciences, Prof		V.F. Bolyukh
(position, academic degree and academic title)	(signature)	(full name)

(the name of the department providing the teaching of the discipline)				
Report from «	»	_2021	No	
Head of Department	Applied Electrical Eng	gineering		K.V. Korytchenko
	(name of the department)		(signature)	(full name)

LETTER OF AGREEMENT

Code and name of	Full name of the head of	Signature, data
specialty	the educational program	
185 Oil and gas		
engineering and	Prof. Fyk I.M.	
technologies		

Head of the specialty support group_____

«____» ____ 2021

(Full name, signature)

Appendix 4

CONFIRMATION LETTER OF THE WORKING EDUCATION PROGRAM

Date of meeting of department -developer of working plan and educational discipline	Protocol number	Head of the department Signature	Heads of the educational program

Appendix 5 OBJECTIVE, COMPETENCE, LEARNING RESULTS AND STRUCTURAL-LOGICAL SCHEME OF EDUCATIONAL DISCIPLINE

The course "Fundamentals of Electronics, Electrical Equipment" is special (professional) for engineering education, including for the field of production and technology, chemical technology and bioengineering. It orients students in the flow of modern scientific and technical information, prepares students to master special disciplines and develops skills that help to further solve engineering problems using electrical approaches, electrical and electronic devices in modern conditions, and in modern fields of science, technology and industries in which students specialize.

The purpose of the course: the formation of students' competencies and learning outcomes in the field of electrical engineering and electronics, by providing them with a base of theoretical and practical training.

Competencies

СК 12	Understanding the general principles of selection of control and	
	automation of technological processes in the oil and gas industry.	

Learning achievements

PH 15	Choose effective means of control and automation of technological
	processes in the oil and gas industry, taking into account the goals and
	existing constraints.

The study of this subject is based	The results of the study of these
directly:	subjects are based directly on:
Higher methometics	Theory of automatic control of
Higher mathematics	technological processes
	Fundamentals of occupational safety and
	human health
	Technology of drilling oil and gas wells
	Machines and equipment for drilling oil
	and gas wells equipment for oil and gas
	production
	Automated design systems for oil and gas
	equipment

Structural-logical scheme of educational subject

DESCRIPTION OF THE EDUCATIONAL SUBJECT (Distribution of teaching time per semester classes and types)

		Total an Fre	nount om this	cla	By type assroom a (hours	e of studies s)	V, CG,	Current control	Semeste	r control
Semester	Total amount (hours) ECTS credits	Classroom studies (hours)	independent work (hours)	Lectures	Laboratory work	Practical studies, seminars	Individual student task (CP, CV C, report)	Control works (number of works)	Pass	Exams
1	2	3	4	5	6	7	8	9	10	11
5	(90)/3	32	58	16	-	16	Report		2	

The ratio of hours of class to total is $\underline{35}$ (%):

STRUCTURE OF THE EDUCATIONAL SUBJECT

Image: A state of the stat	
1 2 3 4 5	
Content module No 1	
«Fundamentals of electrical engineering»	
1 L1 2 <u>Theme 1.</u> Introduction. Basic concepts and laws of 1, 9, 11, 1	2
electrical engineering. DC circuits and their structure.	
Source of electromotive force (EMF). Energy balance	
of an electric circuit. Modes of operation of the	
2 IW1 A Study of basic laws and concepts of electric circuits 1 - 12	
3 PW1 2 Calculation of simple DC circuits with serial parallel and 2.3.8	
mixed connection of elements by the method of	
equivalent transformations (direct problem).	
4 L2 2 Theme 2. General concepts of sinusoidal current 1,9,11,	2
circuits. Characteristics and parameters of sinusoidal	
current. Obtaining and forms of representation of	
sinusoidal currents, voltages, EMF: analytical,	
graphical and vector. Current values of currents,	
voltages, EMF. Elements of an alternating current	
circuit.	
5 IW2 4 Study of characteristics and parameters of sinusoidal 1-12	
<i>Current.</i>	
6 PW2 2 Calculation of simple DC circuits with finxed connection 2, 5, 8	
7 I 3 2 Theme 3 The ratio of sinusoidal voltage and current 1.9.11	2
on ideal elements R I. C. The concept of active and	. 4
reactive support. The ratio of sinusoidal voltage and	
current in a circuit with a series connection of ideal	
elements, active, reactive and full resistance.	
Kirchhoff's laws for electric circuits of sinusoidal	
current.	
8 IW3 4 Study of the basic relations of sinusoidal voltage and 1 - 12	
current in a circuit with a series connection of ideal	
elements.	
9 L4 2 Theme 4. Energy and power in a sinusoidal current 1, 9, 11, 1	2
circuit with ideal K, L, C elements, direction of energy transfor Active reactive and full never in the general	
case of a sinusoidal electric circuit. Dowar balance in	
electrical circuits	
10 IW4 4 Study of capacities in a sinusoidal current circuit with 1 - 12	
ideal R, L, C elements. Drawing up a balance of	

			capacities in electric circuits of alternating current.	
11	L5	2	<u>Theme 5.</u> Three-phase circuits. The principle of obtaining and forms of representation of a three-phase EMF system. Ways to connect the phases of a three-phase source. Linear and phase voltages and their	1, 9, 11, 12
			ratio in three-phase circuits. Ways to include load in a	
			three-phase circuit, types of three-phase load.	
12	PW3	2	Calculation of DC circuits by converting elements connected by a triangle into a star and vice versa.	2, 3, 8
13	IW5	4	Study of the form of representation of a three-phase EMF system and ways to connect the phases of a three-phase source. Study of ways to include load in a three-phase circuit, types of three-phase load.	1 - 12
14	L6	2	<u>Theme 6.</u> Quantities and laws that characterize magnetic fields. Magnetic and non-magnetic materials and their characteristics. Energy saving at chemical industry facilities. Implementation of automation systems for management and control processes. Replacement of morally and physically obsolete electrical equipment with new highly efficient one.	1, 9, 11, 12
15	IW6	4	Study of quantities and laws that characterize magnetic fields in magnetic circuits. Study of the principles of calculation and analysis of magnetic circuits of direct current.	1 - 12
16	IW7	5	Study of the principle of operation of a single-phase transformer. Study of idling modes, short circuit and load, determination of transformer parameters.	1-15
17	PW4	2	Calculation of complex electrical circuits by the method of loop currents.	2, 3, 8
18	IW8	4	Study of the device and principle of operation of a DC machine. Study of EMF and electromagnetic moment, voltage equations and modes of operation.	1 - 12
19	PW5	2	Determining the parameters of the elements of the schemes of replacement of electricity receivers. Calculation of single-phase sinusoidal current circuits with series connection of elements R. L. C.	2, 3, 8
20	IW9	5	Study of the device and principle of operation of a three- phase induction motor.	1 - 12
			Content module No 2 «Fundamentals of electronic»	
21	L7	2	<u>Theme 7.</u> General concepts of sinusoidal current circuits. Characteristics and parameters of sinusoidal current. Obtaining and forms of representation of sinusoidal currents, voltages, EMF: analytical, graphical and vector. Current values of currents, voltages, EMF. Elements of an alternating current circuit.	5, 6, 11, 14
22	IW10	5	Study of the main properties of the electron-hole transition.	
23	PW6	2	Calculation of sinusoidal current circuits at parallel connection R, L, C.	2, 3, 8
24	IW11	5	Study of the main properties of semiconductor resistors and diodes. Their purpose, designation, principle of	1 - 12

			operation, parameters and characteristics.	
25	L8	2	Theme 8. Rectifiers. Block diagram and parameters of	5, 6, 11, 14
			rectifiers. Single-phase rectifiers: circuits, principle of	
			operation, parameters and characteristics. Smoothing	
			filters of rectifiers: schemes, principle of operation,	
			parameters and characteristics.	
26	PW7	2	Calculation of three-phase sinusoidal current circuits	2, 3, 8
			when connecting the phases of receivers by a star.	
27	IW12	5	Study of the basic properties of bipolar transistors. Their	1 - 12
			purpose, designation, principle of operation, parameters	
			and characteristics.	
28	PW8	2	Calculation of three-phase sinusoidal current circuits	2, 3, 8
			when connecting the receiver phases with a triangle.	
29	IW13	5	Study of single-phase rectifiers, their schemes, principle	1 - 12
			of operation, parameters and characteristics.	
Tota	ıl (hours)	90		

Notes

Г

1. The semester number indicates if the subject is taught in several semesters.

2. In the Total (hours) indicator, the number of hours will differ from the total number of class hours by the number of hours allocated to study themes and issues that are studied by the student (paragraph 3 of Appendix 8).

3. The line No 5 indicates the number in accordance with Appendix 14.

Appendix 8

INDEPENDENT WORK

Order No	Name of types of independent work	hours
1	Lecture material processing	10
2	Preparation for practical (laboratory) classes	18
3	Independent study of topics and non-teaching questions	14
4	Perform an independent work	16
5	Other types of independent work	
	Together	58

Appendix 9

INDIVIDUAL TASKS

Summery___

(type of individual task)

№ 3/П	Name of individual task and / or its sections	Terms of implementation (which week)
1.	Issuance of the task	1
2.	Calculation of DC circuits	10
3.	Calculation of single-phase sinusoidal current circuits	14
4.	Task defense	15-16

TEACHING METHODS

(the description of teaching methods is provided) Methods of organization and implementation of training:

- 1. *Lecture*. The lecture uses different techniques of oral presentation of information: maintaining attention for a long time, activating the thinking of students; techniques that provide logical memorization: beliefs, arguments, proofs, classification, systematization, generalizations, etc.
- 2. The method of discussion of educational material and discussion is used at lectures and practical classes. Discussion allows you to significantly deepen and systematize knowledge, understanding of a particular problem, to check the basis of the conclusions reached by students during the study of specific topics. The discussion method develops in them the ability to defend their views and beliefs. The discussion helps to identify, logically and critically understand the different perspectives, scientific concepts and approaches to the issues under consideration. The organization and support of the discussion is achieved through the use of the following techniques: formulation of questions (basic, additional guidance, etc.), discussion of students' answers and opinions, adjustment of answers and formulation of conclusions.
- 3. *Visual and practical <u>teaching methods</u>*. Illustrative teaching methods include illustration and display. Illustration showing students posters, cards, graphics, sketches on the board. Demonstration of lecture materials by multimedia.
- 4. *Practical classes.* The method used in preparing and performing laboratory work is: do as I do. In discussing the results obtained from laboratory work, the method of sequential assimilation of the material throughout the discussion is used.

Appendix 11

CONTROL METHODS

(the description of control methods is provided)

- 1. <u>Current control:</u> surveys, seminars and practical classes, tests, individual tasks, control work.
- 2. <u>Semester control:</u> conducted in the form of an examination with assessment in accordance with the curriculum in the amount of study material defined by the curriculum and within the terms set by the curriculum.

Appendix 12 DISTRIBUTION OF POINTS THAT STUDENTS RECEIVED AND KNOWLEDGE AND SKILLS SCALE (NATIONAL AND ECTS)

Table 1. - Points distribution for student achievement evaluation for passing

Control work	Laboratory works	Course works (Course projects)	Computational graphic tasks	Individual tasks	Others	Passing	Sum
40			40	20		*	100

* Scoring is not required. Passing test can be obtained by accumulating points.

Criteria and system for assessing students' knowledge and skills.

According to the guidelines of ECTS, an assessment system should be understood as a set of methods (written, oral and practical tests, examinations, projects, etc.) used in assessing the achievement of the expected learning outcomes by the students.

Successful assessment of learning outcomes is a precondition for awarding credits to a person under study. Therefore, statements of learning outcomes of programme components should always be accompanied by clear and appropriate **assessment criteria** for awarding credits. This makes it possible to state that the learner has acquired the necessary knowledge, understanding, competences.

Assessment criteria are descriptions of what a person who is learning is expected to do in order to demonstrate the achievement of a learning outcome.

The main conceptual statements of the student's knowledge and skills assessment system are:

1. Improving the quality of training and competitiveness of specialists by stimulating independent and systematic work of students during an academic semester, establishment of constant feedback from teachers to each student and timely correction of his/her learning activities.

2. Improving the objectivity of students' knowledge assessment takes place through monitoring during a semester with the use of a 100-point scale (Table 2). Grades are necessarily translated into the national scale (with the state semester grades "excellent", "good", "satisfactory" or "unsatisfactory") and the ECTS scale (A, B, C, D, E, FX, F).

Rating	ECTS	National	Evaluation criteria			
Assessment, points	assessment and its	assessment	positive		negative	
	definition					
1	2	3	4		5	
90-100	Α	 Deep knowledge of the educational material of the module contained in the main and additional literature sources; ability to analyze the phenomena being studied in their relationship and development; 		the A the c the c onal i the ed in and	Answers to juestions may contain minor naccuracies	
			 ability to perform theoretical calculations; answers to questions are clear, concise, logically consistent; ability to solve complex practical problems. 			
82-89	В	Good	 Deep level of knowledge in the amount of required material provided by the module; ability to give reasonable answers to questions and perform theoretical calculations; ability to solve complex 		Answers to the questions contain certain naccuracies;	
75-81	С	Good	 Strong knowledge of the studied material and its practical application; ability to give reasonable answers to questions and perform theoretical calculations; ability to solve practical problems. 		Inability to use heoretical mowledge to solve complex practical problems.	
64-74	D	Satisfactory	 Knowledge of the basic fundamental provisions of the studying material, and their practical application; the ability to solve simple practical problems. 	Inabilit reason the que - inabili materia perfor - Ina comple proble	ty to give well- ned answers to estions; lity to analyse the al presented and m calculations; bility to solve ex practical ems.	

Table 3 - Knowledge and skills assessment scale: national and ECTS rating

60-63	Е	Satisfactory	 Knowledge of the basic fundamental provisions of the module material, ability to solve the simplest practical problems. 	Ignorance of individual (non-principled) questions from the module material - inability to make a coherent and well- reasoned opinion; - inability to apply theoretical statements in solving practical problems
35-59	FX (потрібне додаткове вивчення)	Fail	Additional study of the module material can be performed in the time provided by the educational curriculum.	Ignorance of the basic fundamentals of the module - significant errors in answering questions; - inability to solve simple practical problems .
1-34	F (потрібне повторне вивчення)	Fail	-	 Complete lack of knowledge of a considerable part of the module's study material; significant mistakes in answering the questions; ignorance of the main fundamentals; inability to orient while solving simple practical tasks

EDUCATIONAL AND METHODICAL SUPPORT OF EDUCATIONAL SUBJECT

(a list of components of the educational and methodological support of the subject and a link to the site where they are located are provided)

- 1) Curriculum
- 2) Work program
- 3) Lecture notes
- 4) Methodical instructions for practical work
- 5) Tickets for exams

BIBLIOGRAPHY RECOMMENDED

Basic literature

No	Назва	Вихідні	Упорядники
π/		данні	(автори)
П			
1	2	3	4
1	Основи електроніки та	К., Освіта	Болюх В.Ф., Данько В.Г.
	мікропроцесорної техніки.	України,	
	Навчальний посібник (гриф	2011. – 260	
	№1/11-3884 від 11.05.10).	c.	
2	Збірник тестів з електротехніки:	Харків: НТУ	Болюх В.Ф.,
	Навчальний посібник	«ХПІ», 2012.	Кожемякін С.М.,
		– 170 c.	Марков В.С.,
			Поляков І.В.
3	Розрахунок електричних кіл.	Харків: НТУ	Данько В.Г.,
	Методичні вказівки до	«ХПІ», 2007.	Поляков I.B.,
	розрахунково-графічної роботи	– 55 c.	Черкасов А.К.
	з курсу «Електротехніка».		
4	Розрахунок параметрів	Харків: НТУ	Болюх В.Ф.,
	електротехнічних пристроїв:	«ХПІ», 2017.	Кожемікін С.М.,
	Навчальний посібник.	-116 c	Марков В.С.
5	Розрахунок електричних кіл та	Харків:	Болюх В.Ф.,
	електротехнічних пристроїв:	Планета-	Коритченко К.В.,
	Навчальний постоник	Прінт, 2019.	Марков В.С.,
		– 288 c.	Поляков І.В.
6	Основи електротехніки,	Харків:	Болюх В.Ф., Данько В.Г.,
	електроніки та	Планета-	Гончаров Є.В.
	мікропроцесорної техніки: Навч.	Принт, 2019.	
	постоник.	<u>– 248 с.</u>	
	Електротехніка та	Аарків:	ьолюх В.Ф.,
	електромеханіка: Навчальнии	BIIB HIY	ьондарук П.А.,
	посіоник	«XIII». –	Коритченко К.В.,
		2020. – 352	Марков В.С.,
		с.	
0		Vorting UTV	шинда С.М. Голгон D.Ф.
ð	зогрник задач з електротехніки		
		«AIII», 2021.	Kоритченко К.В., Марков Р С
		-190 c.	Γ
			гончаров С.Б., Полякор I D
			I IOJINKOB I.D.

9	DOE fundamentals handbook electrical science Volume 1 of 4 Washington,
	D.C.: U.S. Department of Energy, 1992.
10	Eric H. Glendinning, Norman Glendinning Oxford English for Electrical and
	Mechanical Engineering, – Oxford Press, 1995.
11	Navy Electricity and Electronics Training Series. Edition Prepared by
	ETCS(SW) Donnie Jones, 1998.
12	Alan L. Sheldrake Handbook of Electrical Engineering: For Practitioners in the
	Oil, Gas and Petrochemical Industry, John Wiley & Sons, Ltd, 2003, - 625 p.
13	John Bird Electrical Circuit Theory and Technology Oxford Revised: Newnes,
	2003, - 984 p.
14	A First Course in Electrical and Computer Engineering By Louis Scharf.
	CONNEXIONS, Rice University, Houston, Texas, 2009, - 313 p.
15	Tony R. Kuphaldt Fundamentals of Electrical Engineering and Electronics, SDL,
	2011.

INFORMATION RESOURCES ON THE INTERNET

(list of information resources)

Scientific and Technical Library NTU «KPI» library.kpi.kharkov. Methodological support:

http://web.kpi.kharkov.ua/ze/ru/metodycheskoe-obespechenye/

http://web.kpi.kharkov.ua/ze/ru/laboratornye-raboty/

http://web.kpi.kharkov.ua/ze/ru/zadanyya-dlya-studentov-ochnogo-otdelenyya/

FUNDAMENTALS OF ELECTRONIC, ELECTRICAL EQUIPMENT SYLLABUS						
Code and name of the specialty	185 Oil Gas and Condensate Extraction	Institute / faculty	Institute of Education and Science in Chemical Technologies and Engineering			
Name of the program	Fundamentals of Electronic, Electrical Equipment	Department	Department of oil, gas and condensate production			
rogram type Educational and professional Language of study English						
Teacher						

Full name, e-mail korytchenko_kv@ukr.net



General information - scientific degree, academic title, position, number of publications, basic courses...

Doctor of Technical Sciences, Professor, Head of the Department of Applied Electrical Engineering National Technical University "Kharkiv Polytechnic Institute"

The author of more than 80 scientific publications and 7 patents for invention of Ukraine.

Basic courses: "Electrical Engineering and Electromechanics", "Electrical Engineering, Electronics and Microprocessor Technology", "Fundamentals of Electronic, Electrical Equipment"

Scopus Author ID 6603103382

General information about the course

Summary	The course "Fundamentals of Electronic, Electrical Equipment" is special (professional) for engineering education, including for the field of production and technology, chemical technology and bioengineering. It prepares students to master special disciplines and develops skills that help to further solve engineering problems using electrical approaches, electrical and electronic devices in modern conditions, and in modern fields of science, technology and industry in which students specialize.
Course goals	Formation of students' competence and learning outcomes in the field of electrical engineering and electronics, by providing them with a base of theoretical and practical training.
Format	Lectures, practical classes, consultations. Final control - credit
Semester	5

PH 15	Choose effective means of control and automation of technological
	processes in the oil and gas industry, taking into account the goals and
	existing constraints.

Topics covered

Theme 1. DC and AC circuits.

Theme 2. Three-phase electric circuits.

Theme 3. Magnetic circuits.

Theme 4. Energy saving at chemical industry facilities.

Theme 5. Physical processes in semiconductors. Semiconductor resistors, diodes, transistors, thyristors.

Theme 6. Rectifiers. Block diagram and parameters of rectifiers.

Form and methods of teaching

(description of teaching methods is provided)

Methods of organization and implementation of training:

1. *Lecture*. The lecture uses various methods of oral presentation of information: maintaining attention for a long time, activating the thinking of listeners; techniques that provide logical memorization: persuasion, argumentation, evidence, classification, systematization, generalization, etc.

2. The method of discussion of educational material and discussion is used in lectures and practical classes. Discussion allows you to significantly deepen and systematize knowledge, understanding of a problem, to verify the basis of the conclusions reached by students during the study of a particular topic. The method of discussion develops in them the ability to defend their views and beliefs. The discussion helps to identify, logically and critically comprehend different points of view, scientific concepts and approaches to the issues considered. The organization and support of the discussion is achieved through the use of the following techniques: asking questions (basic, additional, leading, etc.), discussing the answers and opinions of students, adjusting the answers and formulating conclusions.

3. *Visual and practical teaching methods*. Illustration and demonstration are used among visual teaching methods. Illustration - showing students posters, maps, graphs, sketches on the board. Demonstration of lecture materials by multimedia means.

4. *Practical classes*. When performing practical tasks, the method is used: do as I do. When discussing the results obtained during the practical tasks, the method of sequential assimilation of the material is used during the discussion.

Control methods

(description of control methods is provided)

1. <u>Current control</u>: surveys, speeches at seminars and practical classes, tests, individual tasks, tests.

2. <u>Semester control</u>: is carried out in the form of a test with an assessment in accordance with the curriculum in the amount of educational material defined by the curriculum and within the time limits set by the curriculum.

Distribution of points that students receive

The distribution of student evaluation scores is calculated individually for each subject, taking into account the features and structure of the course. The current amount of points that a student can gain per one semester can be as high as possible and lower with the points awarded for the exam or pass.

The tables 1 and 2 give an example of the items succeeded by a student who can gain these points, these points may differ and are considered individually for a particular subject.

Control	Laboratory	Course	Computational	Individual	Others	Passing	Sum
work	works	works	graphic tasks	tasks			
		(Course					
		projects)					
40			40	20			100

Table 1. - Points distribution for student achievement evaluation for passing

* Scoring is not required. Passing test can be obtained by accumulating points.

Criteria and system for assessing students' knowledge and skills.

According to the guidelines of ECTS, an assessment system should be understood as a set of methods (written, oral and practical tests, examinations, projects, etc.) used in assessing the achievement of the expected learning outcomes by the students.

Successful assessment of learning outcomes is a precondition for awarding credits to a person under study. Therefore, statements of learning outcomes of programme components should always be accompanied by clear and appropriate **assessment criteria** for awarding credits. This makes it possible to state that the learner has acquired the necessary knowledge, understanding, competences.

Assessment criteria are descriptions of what a person who is learning is expected to do in order to demonstrate the achievement of a learning outcome.

The main conceptual statements of the student's knowledge and skills assessment system are:

1. Improving the quality of training and competitiveness of specialists by stimulating independent and systematic work of students during an academic semester, establishment of constant feedback from teachers to each student and timely correction of his/her learning activities.

2. Improving the objectivity of students' knowledge assessment takes place through monitoring during a semester with the use of a 100-point scale (Table 2). Grades are necessarily translated into the national scale (with the state semester grades "excellent", "good", "satisfactory" or "unsatisfactory") and the ECTS scale (A, B, C, D, E, FX, F).

Rating	ECTS	National	Evaluation criteria		
Assessment,	assessment	assessment	positive		negative
points	and its				
1	2	3	4		5
90-100	A		 Deep knowledge of the educational material of the module contained in the main and additional literature sources; ability to analyze the phenomena being studied in their relationship and development; ability to perform theoretical calculations; answers to questions are clear, concise, logically 		Answers to questions may contain minor inaccuracies
			consistent; - ability to solve comple practical problems.	ex	
82-89	В	Good	 Deep level of knowledge in the amount of required material provided by the module; ability to give reasonable answers to questions and perform theoretical calculations; ability to solve complex practical problems 		Answers to the questions contain certain inaccuracies ;
75-81	С	Good	 Strong knowledge of the studied material and its practical application; ability to give reasonable answers to questions and perform theoretical calculations; ability to solve practical problems. 		- Inability to use theoretical knowledge to solve complex practical problems.
64-74	D	Satisfactory	 Knowledge of the basic fundamental provisions of the studying material, and their practical application; the ability to solve simple practical problems. 	Inabi rease the q - inal mate perfo - Inal comj	ility to give well- oned answers to uestions; bility to analyse the rial presented and orm calculations ; bility to solve plex practical olems .

Table 3 - Knowledge and skills assessment scale: national and ECTS rating

60-63	Е	Satisfactory	 Knowledge of the basic fundamental provisions of the module material, ability to solve the simplest practical problems. 	Ignorance of individual (non-principled) questions from the module material - inability to make a coherent and well- reasoned opinion; - inability to apply theoretical statements in solving practical problems
35-59	FX (потрібне додаткове вивчення)	Fail	Additional study of the module material can be performed in the time provided by the educational curriculum.	Ignorance of the basic fundamentals of the module - significant errors in answering questions; - inability to solve simple practical problems .
1-34	F (потрібне повторне вивчення)	Fail	-	 Complete lack of knowledge of a considerable part of the module's study material; significant mistakes in answering the questions; ignorance of the main fundamentals; inability to orient while solving simple practical tasks

Basic Literature: (A list of literature that provides this subject)

N⁰	Назва	Вихідні	Упорядники
п/		данні	(автори)
П			
1	2	3	4
1	Основи електроніки та	К., Освіта	Болюх В.Ф., Данько В.Г.
	мікропроцесорної техніки.	України,	
	Навчальний посібник (гриф	2011. – 260	
	№1/11-3884 від 11.05.10).	с.	
2	Збірник тестів з електротехніки:	Харків: НТУ	Болюх В.Ф.,
	Навчальний посібник	«ХПІ», 2012.	Кожемякін С.М.,
		– 170 c.	Марков В.С.,
			Поляков І.В.
3	Розрахунок електричних кіл.	Харків: НТУ	Данько В.Г.,
	Методичні вказівки до	«ХПІ», 2007.	Поляков І.В.,

	розрахунково-графічної роботи	– 55 c.	Черкасов А.К.
	з курсу «Електротехніка».		-
4	Розрахунок параметрів	Харків: НТУ	Болюх В.Ф.,
	електротехнічних пристроїв:	«ХПІ», 2017.	Кожемікін С.М.,
	Навчальний посібник.	– 116 c	Марков В.С.
5	Розрахунок електричних кіл та	Харків:	Болюх В.Ф.,
	електротехнічних пристроїв:	Планета-	Коритченко К.В.,
	Навчальний посібник	Прінт, 2019.	Марков В.С.,
		-288 c.	Поляков І.В.
6	Основи електротехніки,	Харків:	Болюх В.Ф., Данько В.Г.,
	електроніки та	Планета-	Гончаров Є.В.
	мікропроцесорної техніки: Навч.	Принт, 2019.	
	посібник.	– 248 c.	
7	Електротехніка та	Харків:	Болюх В.Ф.,
	електромеханіка: Навчальний	ВІТВ НТУ	Бондарук П.А.,
	посібник	«XПI». –	Коритченко К.В.,
		2020. – 352	Марков В.С.,
		c.	Поляков I.B.,
			Шпінда Є.М.
8	Збірник задач з електротехніки	Харків: НТУ	Болюх В.Ф.,
		«ХПІ», 2021.	Коритченко К.В.,
		– 196 c.	Марков В.С.,
			Гончаров Є.В.,
			Поляков I.B.

Secondary literature:

9	DOE fundamentals handbook electrical science Volume 1 of 4 Washington,	
	D.C.: U.S. Department of Energy, 1992.	
10	Eric H. Glendinning, Norman Glendinning Oxford English for Electrical and	
	Mechanical Engineering, – Oxford Press, 1995.	
11	Navy Electricity and Electronics Training Series. Edition Prepared by	
	ETCS(SW) Donnie Jones, 1998.	
12	Alan L. Sheldrake Handbook of Electrical Engineering: For Practitioners in the	
	Oil, Gas and Petrochemical Industry, John Wiley & Sons, Ltd, 2003, -625 p.	
13	John Bird Electrical Circuit Theory and Technology. – Oxford Revised: Newnes,	
	2003, - 984 p.	
14	A First Course in Electrical and Computer Engineering By Louis Scharf.	
	CONNEXIONS, Rice University, Houston, Texas, 2009, - 313 p.	
15	Tony R. Kuphaldt Fundamentals of Electrical Engineering and Electronics, SDL,	
	2011.	

Structural-logical scheme of education subject study

Table 4 List of subjects		
The study of this subject is based	The results of the study of these	
directly:	subjects are based directly on:	
Higher mathematics	Theory of automatic control of	
	technological processes	
Dhysics	Fundamentals of occupational safety and	
PHysics	human health	
	Technology of drilling oil and gas wells	
	Machines and equipment for drilling oil	
	and gas wells equipment for oil and gas	
	production	
	Automated design systems for oil and	
	gas equipment	

Table 4. - List of subjects

Lead Lecturer: <u>Head of the Department of Applied</u> <u>Korytchenko Kostyantyn Volodymirovich</u>

(position, title, full name)

(signature)