Ministry of agriculture of the Republic of Kazakhstan
S. Seifullin Kazakh agrotechnical University.

DISCUSSED
at session
Academic Council of the
University

Protocol № 15
from "30" 05 2019

Approved by
President
JSC "S. Seifullina Kazakh
agrotechnical University. "
A. K. Kurishbayev
"09" 09 2019

EDUCATIONAL PROGRAM

6B08502 "Energy supply and automation of agriculture"

(program name)

Education area code and classification	6B08 Agriculture and bioresources
Code and classification of training areas	6b085 agricultural Engineering
The International standard classification of education code	0731
Degree awarded	bachelor of agriculture
Period of study	4 years
Form of training	intramural
Language of instruction	state / Russian

Nur Sultan 2019

Group of authors:

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The educational program "energy Supply and automation of agriculture" was considered at the meeting of the Department of electrical equipment operation (Protocol No. 10 of 08.04.2019) and approved by the Academic Council of the faculty of energy (Protocol No. 12 of 24.04.2019).

Dean of the faculty of energy _____ Isenov S. S.

Head of department
operation of electrical equipment _____ Sarsikeev E. Zh.

Content of the educational program

1. Passport of the educational program

1.1 purpose of the educational program:

Creation of conditions for effective educational process for the formation and development of personal, socio-cultural, General engineering and professional competencies in the field of energy supply and automation of agricultural processes.

1.2 learning Outcomes

1 to Formulate the purpose and objectives of the work, analyze and determine ways to solve problems in professional activities, organize effective and stress-resistant work performed individually or collectively, using communication skills in Kazakh, Russian and foreign languages.

2 to Use the basic provisions and methods of social and economic Sciences in solving personal and professional problems.

3 to Use information and communication technologies and modern software products to solve personal and professional problems.

4 to Solve professional problems based on the laws of natural Sciences, methods of mathematical analysis and modeling, theoretical and experimental research.

5 to analyze the work environment and organize the protection of personnel and the population from production factors, possible consequences of accidents, catastrophes, natural disasters.

6 to develop projects in the professional sphere and their elements in accordance with the terms of reference and regulatory and technical documentation, as well as to justify design decisions and present the results of the work.

7 to carry out installation, adjustment and repair of objects of professional activity, to keep necessary documentation, and also to use normative-legal documents at carrying out these works.

8 to evaluate the operating modes of equipment and complexes, to determine the most rational parameters, to form conditions for their maintenance, to manage the quality and reliability of the functioning of power supply and automation systems, to offer modern effective technologies and tools.

9 to plan and carry out maintenance and operation of objects of professional activity, to diagnose a condition of the equipment on the basis of measurements and tests, on results to formulate conclusions and recommendations, to conduct the corresponding documentation.

2. General characteristics of the educational program (relevance, features, competitive advantages, uniqueness, etc.)

2.1 Relevance

Food independence of the state plays an important role in ensuring the state independence of the Republic of Kazakhstan. Kazakhstan has a high potential to provide food to the country's population and export it abroad. Modern agriculture is impossible without comprehensive electrification and automation of production processes.

One of the promising directions of the Republic of Kazakhstan is the transformation of agriculture into a high-tech industry with cutting-edge equipment and technologies in crop production, animal husbandry and poultry, in meat, dairy, oil and fat, flour and other types of agricultural industry. New enterprises of subsistence farming and processing of agricultural products are being created and modernized.

To solve such problems of a particular technological process or production, specialists are needed to create and ensure the functioning of electric, heat, cold, gas, water supply systems, as well as their automation in modern conditions.

2.2 Competitive advantages

* This educational program covers training profiles "Energy supply of agriculture", "Automation of agriculture", one of which the student chooses according to their preferences

* Training of energy specialists at the University has been conducted for more than 50 years. The profile of training specialists in automation begins its history with the opening of the specialty "Electrification and automation of agriculture".

* Experienced scientists and academic staff train future specialists, preserving and developing rich traditions in the Department and faculty.

* The training profile "energy supply of agriculture" was developed with the support of the international projects of the European Union Tempus "development of the bachelor's degree program "Energy management" and "Implementation of the quality management system of e-learning in Central Asian Universities".

* All relevant disciplines are provided with modern laboratory facilities (Siemens, Schneider Electric, Danfoss, Festo, Edibon, Arduino, Educational equipment, etc.), there is a research and training ground for wind and solar energy, a training center for energy conservation and energy audit, a specialized laboratory of renewable energy sources in agriculture.

* Full multimedia equipment for all classrooms with audio and video recording to control the quality of the educational process and ensure the safety of students.

* Full provision of educational and methodical materials in the state and Russian languages for classroom and independent work.

* Stable base of practices and employment, close relationship with potential employers and their participation in the development of curricula, programs of special disciplines.

* Profiles of the preparation of this educational program are annually evaluated by independent organizations: according to the evaluation of the National chamber of entrepreneurs "Atameken" took 2nd place, according to the National Agency for accreditation and rating the program in 2017 took 1st place, in 2018-3rd place, according to the National rating for innovation and academic excellence "Kazakhstan 2050" in 2017-2nd place, according to the Independent Kazakhstan Agency for quality assurance in education in 2016 - 2nd place.

2.4 The Potential of the profession (office)

- Electrical engineer.

* Power engineer.

- Engineer-designer

* Test and commissioning engineer.

* Operations engineer.

* Engineer for diagnostics and tests of electrical equipment.

* Engineer for calculations and modes.

* Master of the production site.

* Head of the laboratory.

- Shift supervisor.
- Chief of service.
- Section foreman.

3. Competence model (portrait) of the graduate

3.1 Areas of professional activity

* electricity, heat, gas, cooling of agricultural facilities;

* application of heat and electricity in agriculture;

* electrical equipment and automation of pumping, ventilation, compressor plants;

* electrical equipment and automation of lifting and transport devices and production lines;

* electrical equipment and automation of feed preparation and dispensing machines, waste disposal systems;

* electrical equipment and automation of milking and processing plants for milk and dairy products;

* electrical equipment and automation of grain storage and processing plants;

* electrical equipment and automation of livestock and poultry farms;

* electrical equipment and automation of protected soil complexes;

* lighting and irradiation installations in agriculture.

3.2 Professional activities

Bachelor of the educational program "energy Supply and automation of agriculture" can carry out the following types of professional activities:

* design - design of electrotechnological installations and power supply systems of enterprises and settlements of the agro-industrial complex;

* production and technological-organization of effective use of technological equipment in the production, storage, transportation, processing of agricultural products and maintenance of modes of operation of electrified and automated agricultural technological processes, machines and installations within optimal limits;

* organizational and management - organization, control, supervision and management of operating modes of power supply systems and process equipment;

* research - carrying out experimental and development work in power supply systems and automation of agricultural production;

* educational and pedagogical - teaching of energy disciplines in secondary technical vocational schools;

* installation and adjustment - installation, adjustment, operation and repair of technological equipment and systems of transmission and distribution of heat and electric energy, gas supply;

* service and operational - maintenance, maintenance and overhaul of agricultural power plants, automation and communications, instrumentation, microprocessor and computer equipment.

3.3 General education competences

* Understand the main stages of the history of progressive development of Kazakhstan's statehood in the context of the world and Eurasian processes.

* Have the skills to use ICT for information retrieval and processing.

* To have communication skills in Kazakh / Russian and foreign languages.

* Have an open mind, understand their own national code and national identity, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education.

* To use key ideological concepts such as justice, dignity and freedom, as well as to develop and strengthen the values of tolerance, intercultural dialogue and a culture of peace.

* Correctly Express and argue for their own opinion on issues of social importance.

* Analyze the features of social, political, cultural, psychological institutions in the context of their role in the modernization of Kazakhstan's society.

* Possess basic economic and legal knowledge and carry out business activities.

• Possess the personal, intercultural and civic competences.

* Have a sufficient level of physical readiness of future specialists, a high level of performance, the development of professionally significant physical and psychomotor abilities.

3.4 Core competencies

* To Use the rules of safety, industrial sanitation, fire safety and labor protection.

* To Apply methods of control, diagnostics and testing of power equipment and automation devices in agriculture.

* To form energy-efficient and sustainable modes of operation of agricultural machines, power plants and automation systems

* To Apply fundamental knowledge to specific design, operation and repair tasks using the necessary information sources.

* To Develop the project alternatives and conduct technical and economic comparison.

* To Be prepared to change social, economic, professional roles, geograp hical and social mobility.

* Make economic and organizational decisions in the face of uncertainty and risk.

3.5 Professional competence

* To develop projects of new or modernized systems of power supply of objects of agroindustrial complex.

* To Develop projects of new or modernized automation systems of agricultural facilities.

* To carry out installation, adjustment and repair of the main power equipment and devices of automatics.

* To improve the technological process with the use of modern technologies and techniques.

4 Base of passing of professional practices

"Rodina" Agrofirm, Baiserke-agro, Kaznii of mechanization and electrification of agriculture, Akmola grid distribution company, Astana - regional power grid company, Kyzylorda distribution grid company, Astana electrotechnical plant, Mangistau branch of the main network, AST – Technology, Astana kalalyk Zharyk, New systems - teplolyux, IP-Stroyenergomagistral, Energy service RTD, Energy Consulting Group, laim Group Astana, Master plan KZ, Astana engineering Corporation.

5 Structure of the educational program

№	Name of complexy and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	The complex of General educational disciplines (OOD)	1680	56
1)	Required component	1530	51
	Modern history of Kazakhstan	150	5
	Philosophy	150	5
	Foreign language	300	10
	Kazakh (Russian) language	300	10
	Information and communication technologies (in English)	150	5
	Political science and sociology	120	4
	Cultural studies and psychology	120	4
	Physical culture	240	8
2)	High school component	150	5
	Fundamentals of Economics and law	150	5
	Ecology and BDZ	150	5
2	Complex of basic disciplines (DB)	5130	171
1)	High school component	1590	53
	Math 1	150	5
	Physics	150	5
	Theoretical foundations of electrical engineering 1	240	8
	Electrical measurement	150	5
	Electrical materials science	120	4
	Operation and repair of electrical equipment	210	7
	Theoretical foundations of heat engineering	150	5
	Safety in power plants	150	5
	Educational practice	30	1
	Manufacturing practice	240	8
2)	Optional component	3540	118
	Automated electric drive	240	8
	Fundamentals of mechatronics	240	8
	Engineering graphics	90	3
	Electrical drawings	90	3
	Theoretical mechanics	120	4
	Applied mechanics	120	4
	Math 2	150	5
	Applied problems of mathematics	150	5
	Hydropneumatic machines and drives	150	5
	Agricultural mechanization	150	5

№	Name of complexy and disciplines	Total labor intensity	
		in academic hours	in academic credits
	Technology of installation of electrical equipment and electrical installations	150	5
	Automation elements and devices	150	5
	Digital and microprocessor technology	180	6
	Electronics and microprocessor technology	180	6
	Energoobespechenie agriculture	180	6
	Heat networks and heat supply systems	180	6
	Electric lighting and irradiation	180	6
	Electric lighting of buildings and structures	180	6
	Typical production mechanisms	180	6
	Electrical equipment and electric drive agribusiness	180	6
	Economy and organization of production	150	5
	Investment management	150	5
3	Complex of profile disciplines (PD)	2100	70
1)	University component and (or) optional Component	1500	50
	Electric machine	240	8
	Automatic control	180	6
	Automation and control systems of technological processes	210	7
	Electrotechnology	180	6
	Electrosupply	150	5
	Manufacturing practice	300	10
	Design work	240	8
2)	Optional component	600	20
	Production management	120	4
	Management of operational activities of the enterprise	120	4
	Industrial controller	180	6
	Decentralized energy supply systems	180	6
4	Additional types of training (DVO)	-	-
5	Final certification	360	12
1)	Writing and defending a thesis (project) or preparing and passing a comprehensive exam	360	12
	Subtotal	9270	309

Annex 1. Academic calendar

Министерство сельского хозяйства Республики Казахстан
Казахский агротехнический университет им. С.Сейфуллина

Рассмотрено на заседании
Ученого совета университета
Протокол №____от_____
"_____" _____ 2019 г.

УТВЕРЖДАЮ
Директор департамента по академическим вопросам
АО"КАТУ им.С.Сейфуллина"
_____ Н.А.Серекпаев
"_____" _____ 2019 г.

Академический календарь на 2019-2020 учебный год

Образовательные программы: "Энергообеспечение и автоматизация сельского хозяйства", "Автоматизация и энергетическая эффективность процессов и производств"

Курсы		Сентябрь				Октябрь					Ноябрь					Декабрь					Январь					Февраль					Март					Апрель					Май				Июнь				Июль					Август			
	2020	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24
	###	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28
№ Недели		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
I	П/зд	.	.	.	.	.	.	.	.	.	.	С	С	зд/сз	зд/сз	к	к	к	.	.	.	.	.	.	.	.	.	.	.	С	С	к/сз	./уп	.	.	.	.	.	.	.	С	С	зд/сз	к/л	к/л	к/л	к/л	к/л	=	=	=
II	к	.	.	.	.	.	.	.	.	.	.	С	С	зд/сз	зд/сз	к	к	к	.	.	.	.	.	.	.	.	.	.	.	С	С	к/сз	пп	пп	пп	.	.	.	.	.	.	С	С	зд/сз	к/л	к/л	к/л	к/л	к/л	=	=	=
III	к	.	.	.	.	.	.	.	.	.	.	С	С	зд/сз	зд/сз	к	к	к	.	.	.	.	.	.	.	.	.	.	.	С	С	к/сз	пп	пп	пп	пп	пп	.	.	.	.	С	С	зд/сз/л/вс	к/л/вс	к/л/вс	к/л/вс	к/л/вс	к/л/вс	=	=	=
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Презентация — П
Теоретич. обуч. — .
Экзамен. сессия — С
Каникулы — К
Производств практика — Пп
Летний сем. — л
Учеб. практ — Уп
Сдача отчета — СО
Запись на дисц. — зд
Сдача FX — сз
Военные сборы — вс

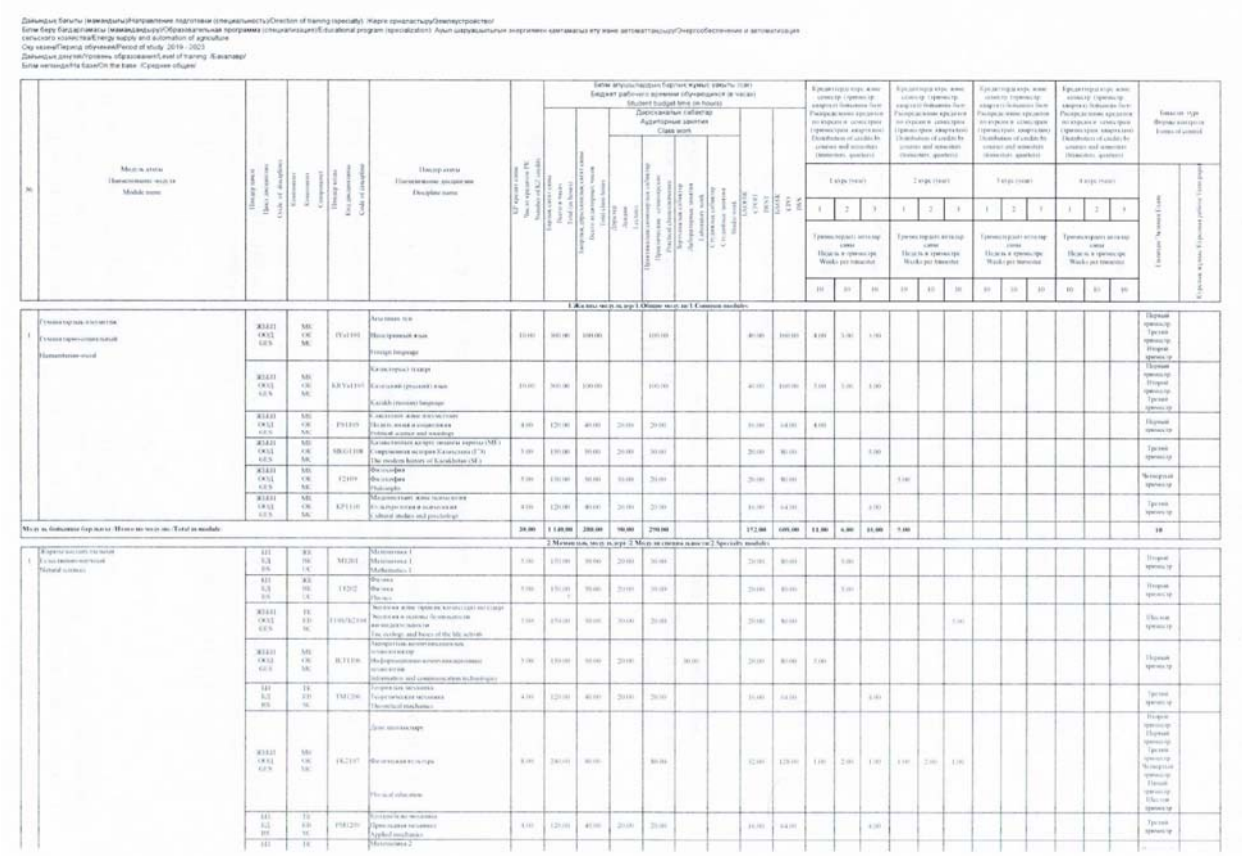
Праздничные дни

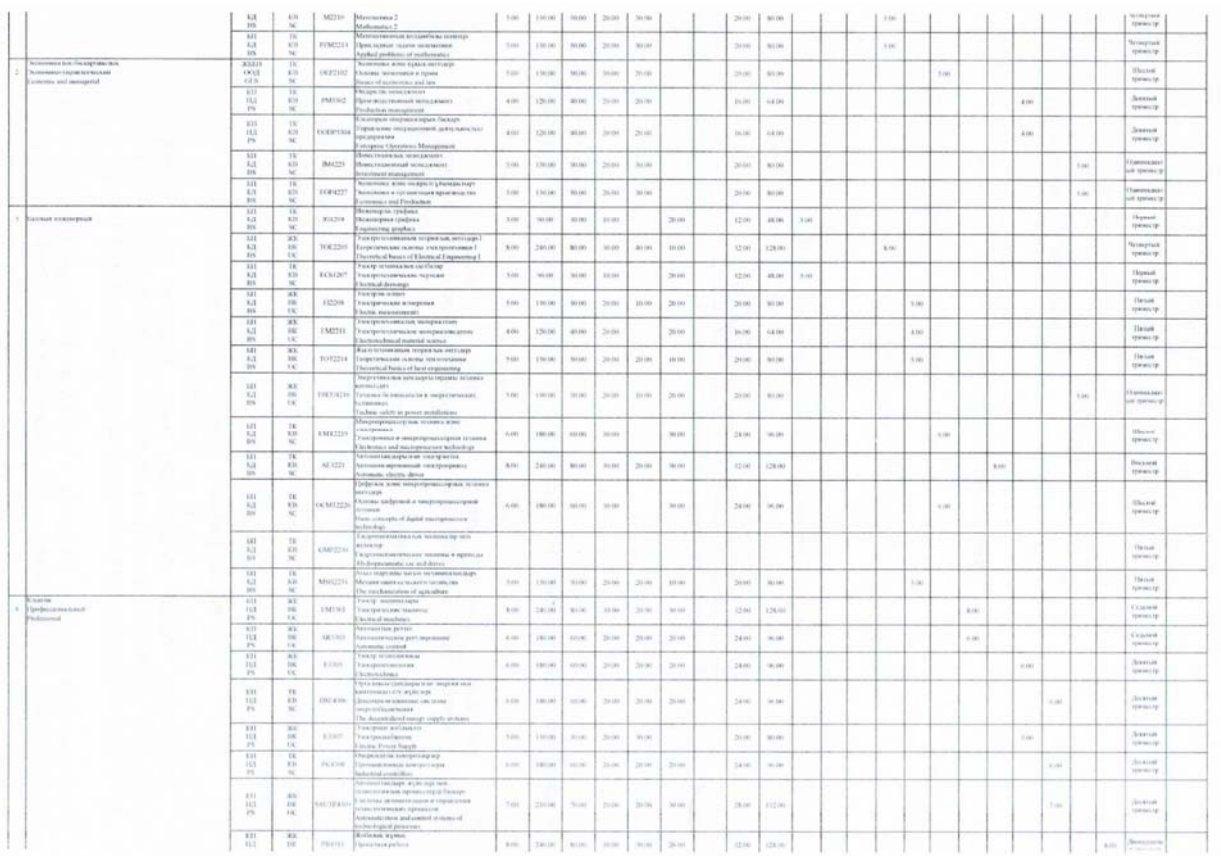
День знаний	1 сентября	Международный женский день	8 марта
День независимости РК	16 - 17 декабря	Праздник "Наурыз"	21-23 марта
Новый год	1-2 января	День единства народов Казахстана	1 мая
День Конституции РК	30 августа	День защитника Отечества	7 мая
		День Победы	9 мая

Декан факультета _____ Исенов С. С. "___"_____2019 г.

Зав.кафедрой ЭЭО Сарсикеев Ж. Е. " " _____2019 г.

Annex 2. Working curriculum





		PS	UC		Project work																									
		БП БД ПС	ТК ЭВ SC	TMEE2215	Электр жабдыктарын жана кондиционерлерин монтаждоо технологиясы Технология монтажа электрооборудования и кондиционеров Technology installation of electric	5.00	150.00	50.00	20.00		30.00		20.00	80.00					5.00							Шестой триместр	
		БП БД ПС	ТК ЭВ SC	EDA2217	Автоматтандыруучу элементтер жана аларга тирек Элементы и устройства автоматизации Elements and devices of automation	5.00	150.00	50.00	20.00		30.00		20.00	80.00					5.00							Шестой триместр	
		БП БД ПС	ЖЕ ПК UK	EKE4218	Электр жабдыктарын пайдалануу жана жөндөө Эксплуатация и ремонт электрооборудования Operation and repair of electrical equipment	7.00	210.00	70.00	30.00	20.00	20.00		28.00	112.00								7.00				Десятый триместр	
		БП БД ПС	ТК ЭВ SC	TMEO229	Ауыл чарбасындагы электрмен жабдоонун Энергообеспечение сельского хозяйства Energy for agriculture	6.00	180.00	60.00	20.00	20.00	20.00		24.00	96.00						6.00						Седьмой триместр	
		БП БД ПС	ТК ЭВ SC	EOO3222	Электр жарыктандыруу жана сүлөөлөрдү Электрическое освещение и облучение Electric light and radiation	6.00	180.00	60.00	20.00	20.00	20.00		24.00	96.00							6.00					Пятый триместр	
		БП БД ПС	ТК ЭВ SC	TPM3223	Типтик өндүрүш механизмдери Типовые производственные механизмы Typical production mechanisms	6.00	180.00	60.00	20.00	20.00	20.00		24.00	96.00							6.00					Пятый триместр	
		БП БД ПС	ТК ЭВ SC	EEA224	АӨК электр жабдыгы жана электрик жетегі Электрооборудование и электропривод АПК Electrical Equipment and Electric drive for Agro-Industrial Complexes	6.00	180.00	60.00	20.00	20.00	20.00		24.00	96.00							6.00					Пятый триместр	
		БП БД ПС	ТК ЭВ SC	TSST3228	Жыл мезгилдеринде жылуу трассалары Тепловые сети в системе теплоснабжения Thermal networks and systems of heat supply	6.00	180.00	60.00	20.00	20.00	20.00		24.00	96.00						6.00						Седьмой триместр	
		БП БД ПС	ТК ЭВ SC	EOJES3229	Электр жарыктандыруу электрдик жарактандыруу Электрическое освещение зданий и сооружений Electric lighting of buildings and installations	6.00	180.00	60.00	20.00	20.00	20.00		24.00	96.00							6.00					Пятый триместр	
		БП БД ПС	ТК ЭВ SC	GMP2232	Гидравликалык машиналар жана жетектер Гидравлические машины и приводы Hydropneumatic car and drives	5.00	150.00	50.00	20.00	10.00	20.00		20.00	80.00				5.00							Пятый триместр	
		БП БД ПС	ТК ЭВ SC	OM3232	Мехатроника негиздери Основы мехатроники Fundamentals of Mechatronics	8.00	240.00	80.00	30.00	20.00	30.00		32.00	128.00							8.00					Восьмой триместр	
Модуль бойынша бардыгы /Итого по модулю/Total in module						**245.00**	**7 350.00**	**2 450.00**	**980.00**	**850.00**	**660.00**		**980.00**	**3 920.00**	**12.00**	**12.00**	**9.00**	**19.00**	**26.00**	**32.00**	**26.00**	**40.00**	**24.00**	**26.00**	**15.00**	**8.00**	**50**	
3 Тандоо бойынша модулдер/3 Модули по выбору/3 Optional modules																														
3	Кесиптик аткаруу Непрофессиональный Professionalny otlo	КА НА ПГ		IOA401	Корутунду мамлекеттик аттестация Итоговая государственная аттестация Final state certification	24.00	720.00																			24.00	Декабрдагы в триместр Декабрьдагы в триместр	
		БП БД ПС	ЖЕ ПК UK	UPJ203	Окуу тажрыйбасы Учебная практика Practical training	1.00	30.00								1.00											Июнүй триместр	
		КП ПД PS	ЖЕ ПК UK	PP4310	Өндүрүш тажрыйбасы Производственная практика Production practice	10.00	300.00																		10.00	Сентябрдагы триместр	
		БП БД ПС	ЖЕ ПК UK	PP3212	Өндүрүш тажрыйбасы Производственная практика Production practice	8.00	240.00												3.00			5.00		10.00	24.00	Шестой триместр-Декабрь триместр	
Модуль бойынша бардыгы /Итого по модулю/Total in module:						**43.00**	**1 290.00**								**1.00**				**3.00**			**5.00**		**10.00**	**24.00**	**6**	
Кредиттер бойынша бардыгы /Итого кредитов /Total credits:						**326.00**	**9 780.00**	**2 830.00**	**1 030.00**	**1 140.00**	**660.00**		**1 132.00**	**4 529.00**	**23.00**	**19.00**	**25.00**	**24.00**	**26.00**	**36.00**	**26.00**	**40.00**	**24.00**	**26.00**	**25.00**	**32.00**	**66**	
Орточа апталык аткаруучунун сагат саны /Средняя недельная загрузка в часах /Weekly average workload at hours:															39.00	27.00	75.00	72.00	78.00	180.00	78.00	120.00	72.00	78.00	75.00	80.00		
ЖББП кредиттеринин саны /Количество кредитов ООД /Total credits in GES:						**61.00**	**1 830.00**	**610.00**	**170.00**	**410.00**	**30.00**		**244.00**	**976.00**	**17.00**	**8.00**	**17.00**	**6.00**	**2.00**	**11.00**								
ЖББП нин МК кредиттеринин саны /Количество кредитов ООД ОК /Number of credits in GES MC						51.00	1 530.00	510.00	110.00	370.00	30.00		204.00	816.00	17.00	8.00	17.00	6.00	2.00	1.00							17	
ЖББП нин ТК кредиттеринин саны /Количество кредитов ООД КВ /Number of credits in GES SC						10.00	300.00	100.00	60.00	40.00			40.00	160.00						10.00							2	
ЖББП нин ЖООК кредиттеринин саны /Количество кредитов по ООД ВК /Number of credits in GES UC																												
БП кредиттеринин саны /Количество кредитов БД /Number of credits in BS:						**171.00**	**4 860.00**	**1 620.00**	**640.00**	**510.00**	**470.00**		**648.00**	**2 592.00**	**6.00**	**11.00**	**8.00**	**18.00**	**24.00**	**25.00**	**12.00**	**40.00**	**9.00**	**7.00**	**15.00**			
БП нин МК кредиттеринин саны /Количество кредитов БД ОК /Number of credits in BS MC																												
БП нин ТК кредиттеринин саны /Количество кредитов БД КВ /Number of credits in BS SC						118.00	3 540.00	1 180.00	460.00	350.00	370.00		472.00	1 888.00	6.00		8.00	16.00	18.00	22.00	12.00	40.00			10.00		23	
БП нин ЖООК кредиттеринин саны /Количество кредитов БД ВК /Number of credits in BS UC						53.00	1 320.00	440.00	180.00	160.00	100.00		176.00	704.00		11.00		8.00	14.00	3.00			9.00	7.00	5.00		11	
КП кредиттеринин саны /Количество кредитов ПД /Number of credits in major:						**70.00**	**1 800.00**	**600.00**	**220.00**	**220.00**	**160.00**		**240.00**	**960.00**							**14.00**		**19.00**	**19.00**	**10.00**	**8.00**		
КП нин МК кредиттеринин саны /Количество кредитов ПД ОК /Number of credits in major MC																												
КП нин ТК кредиттеринин саны /Количество кредитов ПД КВ /Number of credits in major SC						20.00	600.00	200.00	80.00	80.00	40.00		80.00	320.00									8.00	12.00			8	
КП нин ЖООК кредиттеринин саны /Количество кредитов ПД ВК /Number of credits in major UC						50.00	1 200.00	400.00	140.00	140.00	120.00		160.00	640.00							14.00		11.00	7.00	10.00	8.00	7	
КБК кредиттеринин саны /Количество кредитов ДВО /Number of credits in EM:																												
КБК нин ТК кредиттеринин саны /Количество кредитов ДВО КВ /Number of credits in EM SC																												
КА кредиттеринин саны /Количество кредитов НА /Number of credits in FE:						**24.00**	**720.00**																			**24.00**	**2**	

Annex 3. Description of of University an obligatory component disciplines

1. Basic information about the discipline:	
Name of discipline	Modern history of Kazakhstan
2. Prerequisites:	
3. Post-requisites:	Political science and sociology
4. The content of the discipline	Attention is focused on the characteristics of history, the specifics of historical processes and phenomena. The course examines: the features and specifics of historical processes, the formation of the Patriotic spirit of students. The study of the specifics of the subject and methods of historical culture. The discipline is based on theoretical and methodological concepts. Priority is given to national ideas and movements.

1. Basic information about the discipline:	
Name of discipline	Philosophy
2. Prerequisites:	
3. Post-requisites:	
4. The content of the discipline	Formation of openness of consciousness, understanding of own national code and national consciousness, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, cult of knowledge and education, on mastering of such key world Outlook concepts as justice, dignity and freedom, and also development and strengthening of values of tolerance, intercultural dialogue and culture of peace.

1. Basic information about the discipline:	
Name of discipline	Kazakh (Russian) language
2. Prerequisites:	
3. Post-requisites:	
4. The content of the discipline	Formation of social and humanitarian Outlook of students in the context of the national idea of spiritual modernization, involving the development on the basis of national consciousness and cultural code qualities of internationalism, tolerant attitude to world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which are able to ensure the modernization of the country and personal career growth of future specialists.

1. Basic information about the discipline:	
Name of discipline	Information and communication technologies
2. Prerequisites:	
3. Post-requisites:	
4. The content of the discipline	Data analysis. Data management. Database system. Networks and telecommunications. Cybersecurity. Internet technology. Cloud and mobile technologies. Multimedia technologies. Smart technologies: the IoT, Big Data, the Block chain. Artificial intelligence. Green technologies in ICT. Teleconferences. E-technologies. E-business. E-learning. E-government. Information technology and professional sphere. Industrial ICT.

1. Basic information about the discipline:	
Name of discipline	Foreign language
2. Prerequisites:	

3. Post-requisites:	
4. The content of the discipline	The main purpose of the discipline "Foreign language" is the formation of communicative competence, i.e. the ability and willingness to carry out foreign language interpersonal and intercultural communication with native speakers.

1. Basic information about the discipline:	
Name of discipline	Political science and sociology
2. Prerequisites:	
3. Post-requisites:	Philosophy
4. The content of the discipline	The section "Sociology" is intended to form the ability of critical understanding of the system of interpersonal relations in society, awareness of the nature of society, the system of its groups and institutions. The section "political Science" forms knowledge about the laws and laws of world politics and modern political processes, explaining the essence and content of the policy of national States. Formation of social and humanitarian Outlook as the basis of modernization of public consciousness.

1. Basic information about the discipline:	
Name of discipline	Cultural studies and psychology
2. Prerequisites:	
3. Post-requisites:	Philosophy
4. The content of the discipline	The section "cultural Studies" is aimed at the development of social and humanitarian Outlook, the ability to analyze and assess cultural situations, the specificity of cultural objects, the role of cultural values in intercultural communication. Fundamentals of General psychology, personality psychology, individual typological features of personality: temperament, character, abilities; Emotional and volitional sphere of personality, Cognitive processes: memory, attention, imagination, thinking and speech. Psychology of professional communication

1. Basic information about the discipline:	
Name of discipline	Physical culture
2. Prerequisites:	
3. Post-requisites:	
4. The content of the discipline	Discipline will help students to become a harmoniously developed personality, acquire knowledge in the field of physical culture, improve health. Ensuring a sufficient level of physical readiness of future specialists, a high level of performance, the development of professionally significant physical and psychomotor abilities, improving the sportsmanship of student-athletes.

1. Basic information about the discipline:	
Name of discipline	Fundamentals of Economics and law
2. Prerequisites:	
3. Post-requisites:	
4. The content of the discipline	Fundamentals of social production and forms of social economy. The mechanism of functioning of the market system. Production, costs and income of the firm. National economy. Economic growth and instability of the market economy . Inflation and unemployment are manifestations of economic instability. Fundamentals of the theory of state and law, constitutional law, administrative law, civil law, labor law, family law, criminal law.

1. Basic information about the discipline:	
Name of discipline	Ecology and BDZ
2. Prerequisites:	
3. Post-requisites:	Safety in power plants, Course and diploma design
4. The content of the discipline	Ecosystem and environmental factors. The biosphere and the modern noosphere. Global environmental problems of our time. Social and environmental problems of our time. Technosphere and industrial safety. Industrial and fire safety. Radiation and chemical safety. Emergencies of peace and war. Civil defense. Environmental safety as an aspect of life safety.

1. Basic information about the discipline:	
Name of discipline	Math 1
2. Prerequisites:	-
3. Post-requisites:	Theoretical foundations of electrical engineering
4. The content of the discipline	Elements of linear algebra and analytic geometry. Introduction to mathematical analysis. Differential calculus of functions of one variable. Functions of several variables. Integral calculus of functions of one variable. Ordinary differential equation

1. Basic information about the discipline:	
Name of discipline	Physics
2. Prerequisites:	
3. Post-requisites:	Theoretical foundations of electrical engineering, Electrical measurements
4. The content of the discipline	Physical foundations of mechanics. Statistical physics and thermodynamics. Electrodynamics. Physics of oscillations and waves. Wave and quantum optics. Elements of quantum physics. Physics of atomic nuclei

1. Basic information about the discipline:	
Name of discipline	Theoretical foundations of electrical engineering 1
2. Prerequisites:	Physics, Mathematics 1
3. Post-requisites:	
4. The content of the discipline	Basic concepts and definitions of the theory of electric circuits. 2 linear DC electrical circuits. Electrical circuits of single-phase sinusoidal current. Electrical circuits with mutual inductance. Three-phase circuits. Periodic non-sinusoidal currents. Nonlinear DC circuits. Two-port networks and electric filters

1. Basic information about the discipline:	
Name of discipline	Electrical measurement
2. Prerequisites:	Physics
3. Post-requisites:	
4. The content of the discipline	Modern Metrology. Measurement process. Measurement error. Processing and presentation of the measurement result. Measuring instruments for static measurements. Measuring instruments for dynamic measurements. Analog measurements of basic electrical quantities. Analog measurements of non-electrical quantities. Digital measurements: computer measurement methodology. Digital measurements of electrical quantities. Digital registration of measurements. Information and measuring systems and complexes. Measurement automation.

1. Basic information about the discipline:	
Name of discipline	Electrical materials science

2. Prerequisites:	Physics
3. Post-requisites:	Course and diploma design
4. The content of the discipline	Basic information about the structure of matter. Classification of dielectrics. Characteristics of dielectrics. Breakdown of dielectrics. Dielectric strength. Conductor materials. Classification. Electrical conductivity of metals. Semiconductor material. Magnetic material.

1. Basic information about the discipline:	
Name of discipline	Operation and repair of electrical equipment
2. Prerequisites:	Electric machines, Automated electric drive
3. Post-requisites:	Course and diploma design
4. The content of the discipline	Basic concepts and definitions. Operational properties of electrical equipment. Reliability properties. Influence of quality of the electric power on work of electric receivers. Operational reliability of electrical equipment. Theory of acquisition and diagnostics of electrical equipment. General issues of capital repairs. Technology of overhaul of electric machines of direct and alternating current. Testing of electrical machines after repair. Technology of overhaul of power transformers. Drying of transformer windings.

1. Basic information about the discipline:	
Name of discipline	Theoretical foundations of heat engineering
2. Prerequisites:	Physics
3. Post-requisites:	Heat networks and heat supply systems, Electrotechnology
4. The content of the discipline	Basic concepts and definitions of thermodynamics. The first law of thermodynamics and its application to the analysis of polytropic processes. Cyclic process. The second law of thermodynamics. Thermodynamic analysis of thermal devices. Thermodynamics of gas flows. Phase transitions in thermodynamic systems. Mechanisms of heat transfer, thermal conductivity. Convective heat transfer. Heat exchange by radiation. Heat and mass transfer devices. Heat generating devices.

1. Basic information about the discipline:	
Name of discipline	Safety in power plants
2. Prerequisites:	Ecology and BDZ
3. Post-requisites:	Course and diploma design
4. The content of the discipline	Legal and safety regulations. General issues of electrical safety. Electrical protective equipment. Protection against electric shock. Calculation of earthing devices in two-layer soil. Safety during electrical work. Safety during repair of electrical equipment. Safety during operation of electrical installations. Occupational hygiene and industrial sanitation. Fire safety

1. Basic information about the discipline:	
Name of discipline	Educational practice
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	Familiarization with the organizational structure of the University; familiarization with the organization of the educational process; tour of educational buildings and classrooms; familiarization with the functions and content of work in educational laboratory classrooms; familiarization with safety in classrooms; familiarization with regulatory and technical documentation, QMS for registration of student works; registration of the report on practice

1. Basic information about the discipline:	
Name of discipline	Manufacturing practice
2. Prerequisites:	Technology of installation of electrical equipment and electrical installations
3. Post-requisites:	Course and diploma design
4. The content of the discipline	The results of the tasks, paperwork. Safety instruction (General). Safety training and workplace instruction. Familiarization with the enterprise and its power supply and automation system. Performance of production tasks. The study of theoretical material. Independent work with literature and technical documentation. Collection, processing, systematization and analysis of factual and literary materials.

1. Basic information about the discipline:	
Name of discipline	Electric machine
2. Prerequisites:	Theoretical foundations of electrical engineering 1
3. Post-requisites:	Automated electric drive
4. The content of the discipline	The device and the principle of operation of the transformer. Vector diagram. The equivalent circuit of the transformer. DC machines. MPT excitation system. Electrical characteristics of generators. Classification of windings, design principles of windings. Asynchronous motor design. Energy diagram of an asynchronous motor. Moments of the asynchronous motor. The concept of the reaction anchor. Armature reaction of 3-phase synchronous generator. The vector diagram of the synchronous generator.

1. Basic information about the discipline:	
Name of discipline	Automatic control
2. Prerequisites:	Theoretical foundations of electrical engineering
3. Post-requisites:	Automation and control systems of technological processes
4. The content of the discipline	Basic concepts and definitions. The object of control and influence on it. The composition of the SAR. Basic principles. Laws. Classification. Block diagram. Operating mode. The differential equation is linear. Dynamic characteristic. Transfer function, time characteristics. The frequency characteristics, the advanced features. The model links the dynamic Stability, stability criteria. Analysis of the quality of regulation..

1. Basic information about the discipline:	
Name of discipline	Automation and control systems of technological processes
2. Prerequisites:	Automation elements and devices, Automated electric drive
3. Post-requisites:	Course and diploma design
4. The content of the discipline	General information. Requirements for automation systems. Types of technological processes. Sensors. Actuator. Typical production mechanisms. Control system. Accuracy, speed and quality of regulation. SCADA-system.

1. Basic information about the discipline:	
Name of discipline	Automation and control systems of technological processes
2. Prerequisites:	Automation elements and devices, Automated electric drive
3. Post-requisites:	Course and diploma design
4. The content of the discipline	General information. Requirements for automation systems. Types of technological processes. Sensors. Actuator. Typical production mechanisms. Control system. Accuracy, speed and quality of regulation. SCADA-system.

1. Basic information about the discipline:

Name of discipline	Electrotechnology
2. Prerequisites:	Physics
3. Post-requisites:	Diploma design
4. The content of the discipline	Resistance heating. Induction heating. Electric arc technology. Plasma technologies and installations. Electron beam heating and laser technologies. The use of ultrasound. Electron-ion electrotechnologies. Use of electrostatic fields. Electrolysis technologies. Electrolyte technologies. Electroerosion technology

1. Basic information about the discipline:	
Name of discipline	Electrosupply
2. Prerequisites:	Theoretical foundations of electrical engineering 1
3. Post-requisites:	Course and diploma design
4. The content of the discipline	Basic concepts of electrical receivers and consumers of electricity. Modes of operation of electric receivers. Methods of calculation of electric loads. Center of electrical loads. Select the location of the power supply. Selection of cable and wire core cross-section. Selection of protective and switching equipment. Selection of power transformers. Switchgear equipment. Schemes of substations.

1. Basic information about the discipline:	
Name of discipline	Manufacturing practice
2. Prerequisites:	Training practice, Electric machines
3. Post-requisites:	Course and diploma design
4. The content of the discipline	The results of the tasks, paperwork. Safety instruction (General). Safety training and workplace instruction. Familiarization with the enterprise and its power supply and automation system. Performance of production tasks. The study of theoretical material. Independent work with literature and technical documentation. Collection, processing, systematization and analysis of factual and literary materials.

1. Basic information about the discipline:	
Name of discipline	Design work
2. Prerequisites:	Power supply, Operation and repair of electrical equipment, electrical Technology
3. Post-requisites:	Course and diploma design
4. The content of the discipline	The importance of design in the implementation of complex electrification and automation of production. General requirements for the project. Stages of real design. Composition of the working project. The source materials for the design. Standard project. The procedure for coordination and approval of projects. The specifics of production and its consideration in the design. Design of fire alarm systems. Design of elements of heating, ventilation and Sewerage systems.

Annex 4. Description of elective component disciplines

1. Basic information about the discipline:	
Name of discipline	Automated electric drive
2. Prerequisites:	Electric machine
3. Post-requisites:	Operation and repair of electrical equipment
4. The content of the discipline	Concept and definitions. Functions and requirements. Mechanical characteristics of production mechanisms, DC motors, asynchronous motors. Equation of motion of the electric drive. Reduction of moments and efforts. Transient processes in electric drives. Speed regulation of electric drives.

1. Basic information about the discipline:	
Name of discipline	Fundamentals of mechatronics
2. Prerequisites:	Electric machine
3. Post-requisites:	Automation and control systems of technological processes
4. The content of the discipline	Definitions and terminology of mechatronics. Principles of mechatronics. Methods of construction of mechatronic devices. Industrial robots, basic concepts, classification. Principles of construction of industrial robots, their characteristics. Kinematics of manipulators. Direct and inverse problems of manipulator kinematics. Calculation of characteristics of manipulators of industrial robots. Drives mechatronic devices, industrial robots and auxiliary equipment. Principles and control systems of mechatronic and robotic devices.

1. Basic information about the discipline:	
Name of discipline	Engineering graphics
2. Prerequisites:	-
3. Post-requisites:	Course and diploma design
4. The content of the discipline	Methods of image spatial geo-metric figures on the plane. Methods for solving metric and positional problems in space from these images. Views, sections and cross-sections. Detachable and all-in-one connections. Detailing and sketching. COMPASS graphics editor. Autocad graphics editor.

1. Basic information about the discipline:	
Name of discipline	Electrical drawings
2. Prerequisites:	-
3. Post-requisites:	Course and diploma design
4. The content of the discipline	General information. Electrical diagrams, symbols used in circuits . Schematic diagram. Technique of reading circuit diagrams. Rules of execution of electrical circuits. Schematic diagrams of the electric drive. The content and purpose of connection schemes. Drawings of electrical devices. Drawings of power grids. Drawings of electric lighting networks. Automatic control schemes. Equipment of reading schemes of automation

1. Basic information about the discipline:	
Name of discipline	Theoretical mechanics
2. Prerequisites:	Physics
3. Post-requisites:	Automated electric drive
4. The content of the discipline	Basic concepts and axioms of statics. Arbitrary plane system of forces. Friction. Center of gravity. Kinematics of a point. Movement of a solid

	body. Basic theorems of dynamics. Stretching and compression. Shear and torsion. Bend. Basic theories of stress and strain state. Stability. The main provisions of the machine parts. Basic concepts about the transmission. Shafts and axles. Couplings: permanent, driven, self-driving.

1. Basic information about the discipline:	
Name of discipline	Applied mechanics
2. Prerequisites:	Physics
3. Post-requisites:	Automated electric drive
4. The content of the discipline	Kinematic analysis of mechanisms. Ways to set movement. Friction in kinematic pairs. PERFORMANCE. Strength of materials. Gear. Details of machines. Structural material. Heat treatment. Kinematic and power calculation of the drive. Shafts, axles, couplings, bearings, springs.

1. Basic information about the discipline:	
Name of discipline	Math 2
2. Prerequisites:	Math 1
3. Post-requisites:	Theoretical foundations of electrical engineering 2
4. The content of the discipline	Basic concepts of probability theory. Types of random events. Classical definition of probability. The amount of events. The theorem of addition of probabilities of events.. Types of random variables. The law of probability distribution of a random variable. Numerical characteristics of discrete random variables. Continuous random variables. Numerical characteristics of continuous random variables. Problems of mathematical statistics. General population and stratified sampling.

1. Basic information about the discipline:	
Name of discipline	Applied problems of mathematics
2. Prerequisites:	Math 1
3. Post-requisites:	Theoretical foundations of electrical engineering 1
4. The content of the discipline	The concept of series. Numerical series. Functional series. Power series. Applications of Taylor and Fourier series. The concept of a complex number. Geometric representation of complex numbers. Forms of writing complex numbers. Operations on complex numbers. Fields of application of complex numbers.

1. Basic information about the discipline:	
Name of discipline	Hydropneumatic machines and drives
2. Prerequisites:	Theoretical mechanics, Applied mechanics
3. Post-requisites:	Design work
4. The content of the discipline	Introduction. Hydrodynamic transmission. Volumetric pumps and hydraulic motors. Hydraulic equipment, auxiliary devices and hydraulic lines. Volumetric hydraulic drive. Tracking hydraulic drives. Impulse hydraulic drives. Pneumatic actuator

1. Basic information about the discipline:	
Name of discipline	Agricultural mechanization
2. Prerequisites:	Theoretical mechanics, Applied mechanics
3. Post-requisites:	Design work
4. The content of the discipline	The main directions of development of technologies and means of mechanization of agricultural production. Properties of agricultural materials and media. Energy means of mechanization of agricultural production. Technologies and means of mechanization of agricultural production processes. Technologies mechanized processes and equipment

	for storage and processing of agricultural products. Methods of research and testing of agricultural machinery and equipment.

1. Basic information about the discipline:	
Name of discipline	Technology of installation of electrical equipment and electrical installations
2. Prerequisites:	-
3. Post-requisites:	Manufacturing practice
4. The content of the discipline	Basic concepts and definitions. Normative document. Classification of electrical installations. Organization of works. Wirings. Connection of wires and cables. Installation of electric motors. Installation of lighting electrical installations. Installation of electrical devices. Installation of controls and protection of electric motors. Installation of shields. Installation of transformer substations and switchgear. Device and installation of cable lines. Device and installation of overhead lines. Installation of grounding devices.

1. Basic information about the discipline:	
Name of discipline	Automation elements and devices
2. Prerequisites:	-
3. Post-requisites:	Automation and control systems of technological processes
4. The content of the discipline	General information. Classification. Electromagnets, electromagnetic relays. Sensors of pressure, flow, level, temperature, humidity, concentration, movement, vibration and position, photo sensors. DAC. ADC. The device and principle of work of Executive mechanisms

1. Basic information about the discipline:	
Name of discipline	Automation elements and devices
2. Prerequisites:	-
3. Post-requisites:	Automation and control systems of technological processes
4. The content of the discipline	General information. Classification. Electromagnets, electromagnetic relays. Sensors of pressure, flow, level, temperature, humidity, concentration, movement, vibration and position, photo sensors. DAC. ADC. The device and principle of work of Executive mechanisms