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

DISCUSSED
at session of
Academic Council of the University

Protocol№ 15
from "30" 05 2019 .

Approved by
President
JSC " S. Seifullin Kazakh
agrotechnical University"
_____ A. K. Kurishbayev
"02" 09 2019 .

SAKEN SEIFULLIN UNIVERSITY

EDUCATIONAL PROGRAM
8D08703 " Energy supply and automation of agriculture»
(program name)

Education area code and classification	8D08 Agriculture and bioresources
Code and classification of training areas	8D085 agricultural Engineering
International standard classification of education code	0731
Degree awarded	Doctor of philosophy/ PhD
Period of study	3 years
Form of training	intramural
Language of instruction	state / Russian

Nur Sultan 2019

Group of authors:

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The author's team was approved by the order of JSC " KATU S. Seifullin " No. 932-N from 12.12.2018

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

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

Head of department of

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 carry out teaching activities on educational programs of higher education in the professional sphere at a high modern level.
2. To apply the methodology of theoretical and experimental research in the field of control of technical systems and automation of technological processes..
3. To use modern technologies in the field of energy supply and automation of agriculture, agricultural production, including the use of the latest information and communication technologies.
4. To organize the work of the research team on the problems of energy supply and automation of agriculture, agricultural production technologies.
5. To develop and implement modern methods and technologies to improve the reliability, quality and efficiency of operation for the created and modernized systems of energy supply and automation of agriculture.
6. To carry out control and diagnostics of technical condition of the equipment of systems of power supply and automation, to make its preventive tests and repair.
7. To apply methods of estimation of technical and economic characteristics, ways of increase of reliability, quality and efficiency of systems.

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 and animal husbandry, in meat, dairy, oil and fat, flour and other types of agricultural industry. New and modernizing existing enterprises of crop production, animal husbandry and processing of agricultural products.

Production highly educated, competitive scientific personnel on creation and maintenance of functioning of systems of electro -, heat -, cold -, gas -, water supply, and also their automation in modern conditions are necessary for introduction of new innovative technologies in agricultural.

2.2 Competitive advantages

• This educational program covers training profiles "energy supply of agriculture", "automation of agriculture", the doctoral student chooses one of that according to his preferences

* Training of scientific personnel of the energy profile at the University has been conducted for more than 50 years. The profile of scientific personnel training 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.

* Developed material and technical base (Siemens, Schneider Electric, Danfoss, Festo, Edibon, Arduino, Training 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 research and production practices, close relationship with representatives of industry, agriculture and their participation in the development of curricula, programs of special disciplines.

2.4 the Potential of the profession (office)

* Deputy first head of energy.
- Chief power.
- technical Director.
- Head of department.
- Director of department.

3. Competence model (portrait) of the graduate

3.1 Areas of professional activity

***** Transmission, distribution and application of electricity, heat and gas.
* Power supply systems of agricultural enterprises, rural settlements.
* Power plants, power plants and complexes based on renewable energy sources.
* Electrical and electronic devices, devices and process control systems.
* Electric drives of power, technological and auxiliary installations, Converter devices, systems of their automation, control and diagnostics.
* Low and high voltage electrical equipment, electrical installations.

3.2 Professional activities

A graduate of the educational program "energy Supply and automation of agriculture" can carry out the following types of professional activities:
design activity: preparation and development of design documentation, calculation and design of elements of power supply systems and automation of agricultural production;
research: carrying out theoretical, experimental and development work in power supply systems and automation of agricultural production;
production and technological activities: development and implementation of innovative technologies to improve the efficiency of energy supply systems and automation of agricultural facilities, development
organizational and management activities: organization of team work, management decisions; organization of staff training; assessment of costs to ensure product quality; adaptation of modern equipment and technologies, implementation of technical control and quality management;
educational and pedagogical: teaching of specialized disciplines in higher educational institutions.4

3.3 General education competences

* To know the legal and regulatory framework of teaching activities in higher education;
* To know the requirements for qualification works of bachelors, specialists, masters;
* To know modern ways of using information and communication technologies in the chosen field of activity;
* To know the basic principles of the organization of work in the team and ways to resolve conflict situations
* To be able to carry out selection of students in bachelor's degree, specialization and master's degree for performance of research and qualification works;
* To be able to collect, select and use the necessary experimental data and effectively apply quantitative methods of their analysis;
* To be able to choose and use the best teaching methods;
* To be able to supervise the implementation of qualification works of bachelors, specialists, masters;

* To possess the technology of designing the educational process at the level of higher education;
* To possess methods and technologies of interpersonal communication, skills of public speech in the state, Russian and English languages;
* To possess organizational skills, planning and distribution of work among the members of the research team;
* To possess skills of collective discussion of work plans, obtained scientific results, coordination of interests of the parties and settlement of conflict situations in the team.

3.4 Core competencies

* To know theoretical and methodological bases of research of problems of power supply and automation of agriculture; possibilities of use of new modern methods at carrying out researches;
* To know the history of formation and development of the main scientific schools, polemics and interaction between them; actual problems and trends in the development of research in the field of energy supply and automation of agriculture;
* To be able to choose and apply experimental research methods in professional activities;
* To be able to choose and apply in professional activity calculation and theoretical methods of research;
* To be able to choose the most effective and new methods of solving the main types of problems encountered in the study area;
* To be able to plan scientific work, form the composition of the working group and optimize the distribution of responsibilities among the members of the research team;
* To possess the methodology of research activities in the field of energy supply and automation of agriculture;
* To apply skills of modern methods of scientific research in the field of energy supply and automation of agriculture successfully and systematically;
* To possess the skills of search using information systems and databases and critical analysis of information on the subject of research;
* To possess the skills of research planning, analysis of the results and formulation of conclusions;
* To find the most effective and new solutions for the development of new methods in the study area.

3.5 Professional competence

* To know how to build power supply systems and automation; methods of assessing the technical and economic characteristics of these systems;
*To know the norms and volumes of preventive testing and repair of electrical equipment and automation equipment;
* To know features of modes of operation of power supply systems and automation; ways of increase of their reliability, quality and efficiency;
* To be able to control the technical condition of power equipment and measuring devices and automation;

* To be able to diagnose the technical condition of the equipment and predict the timing of its withdrawal for repair;
* To have skills in designing power supply and automation systems;
* To have the skills to diagnose the technical condition of the equipment;
* To have skills of calculations of characteristics of systems of power supply and automation and to form their steady and effective modes of work.

4 Base of professional practice

"Rodina" Agrofirm Baiserke-agro, Kaznii of mechanization and electrification of agriculture, Akmola grid distribution company, Astana - regional power grid company, Kyzylorda grid distribution 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

Scientific and pedagogical direction

№	Name of complexes and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	Complex of basic disciplines (DB)	1110	37
1)	High school component	690	23
	Actual problems of power supply and automation of agriculture	210	7
	Scientific bases of power supply and automation	180	6
	Pedagogical practice	300	10
2)	Optional component	420	14
	Quality and reliability of power supply systems	210	7
	Diagnostics of systems of power supply and automation of agroindustrial complex	210	7
2	Complex of profile disciplines (PD)	900	30
1)	High school component	480	16
	Methodology of teaching technical disciplines	90	3
	Decentralized energy supply systems	240	8
	Research practice	150	5
2)	Optional component	420	14
	Planning of research	210	7
	Research management	210	7
3	Research work of a Phd student, including internships and Phd dissertation	3450	115
4	End of course certification	360	12
1)	Preparation and defense of Phd dissertation	360	12
	Subtotal	5820	194

Profile direction

№	Name of complexes and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	Complex of basic disciplines (DB)	1110	37
1)	High school component	690	23
	Actual problems of power supply and automation of agriculture	210	7
	Scientific bases of power supply and automation	180	6
	Manufacturing practice	300	10
2)	Optional component	420	14
	Quality and reliability of power supply systems	210	7
	Diagnostics of systems of power supply and automation of agroindustrial complex	210	7
2	Complex of profile disciplines (PD)	900	30
1)	High school component	480	16
	Methodology of teaching technical disciplines	90	3
	Decentralized energy supply systems	240	8
	Manufacturing practice	150	5
2)	Optional component	420	14
	Planning of research	210	7
	Research management	210	7
3	Experimental research work of a Phd student, including internships and Phd projects	3450	115
4	End of course certification	360	12
1)	Preparation and defense of Phd dissertation	360	12
	Subtotal	5820	194

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 2019-2021 учебные годы

Образовательные программы научно-педагогическое направление: Энергообеспечение и автоматизация сельского хозяйства, Управление техническими системами

Срок обучения: 3 года

Период		Сентябрь				Октябрь					Ноябрь				Декабрь				Январь					Февраль				Март				Апрель					Май				Июнь				Июль					Август			
Нед.		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
1 курс 2019-2020 уч.г.	Нач.	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
	Кон.	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
		п/зд	.	.	.	.	.	.	.	.	.	.	с	с	зд/сз	зд/сз	к	к	к	.	.	.	.	.	пп	пп	пп	пп	пп	с	к/сз	ип	ип	ип	ип	ип	./н	./н	./н	./н	./и	с	зд/сз	к/л	к/л	к/л	к/л	к/л	к/л	к	к	к	к

Период		Сентябрь				Октябрь					Ноябрь				Декабрь				Январь					Февраль				Март				Апрель					Май				Июнь				Июль					Август			
	Нед.	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
2 курс 2020-2021 уч.г.	Нача:	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8	15	22	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23
	Кон.	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27
		П	н	н	н	н	н	н	н	н	н	н	с	с	сз	сз	к	к	к	н	н	н	н	н	н	н	н	н	н	с	к/сз	к/сз	н	н	н	н	н	н	н	с	с	к/л	к/л	к/л	к/л	к/л	к/л	к	к	к	к

Ш	Нед.	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
	Нача:	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	17	21	28	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22
	Конец	3	10	17	24	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29	6	13	20	27	03	10	17	24	1	8	15	22	29	5	12	19	26
	2021-	П	н	н	н	н	н	н	н	н	н	н	с	с	сз	сз	к	к	к	н	н	н	н	н	н	н	н	н	н	с	к/сз	к/сз	н	н	н	н	н	н	к/сз	иа	иа	иа	иа	иа	иа	иа	иа								

*НИРД в период теоретического обучения

Презентация	Теоретич. обуч.	Экзамен. сессия	Каникулы	Исслед. практика	Педаг. практика	Летний сем.	Запись на дисц.	Сдача FX	Итоговая аттестация	НИРД
п	.	с	к	ип	пп	л	зд	сз	иа	и

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

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

Рассмотрено на заседании
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АО"КАТУ им.С.Сейфуллина"
_____ Н.А.Серекпаев
"_____" _____ 2019 г.

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Срок обучения: 3 года

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	Нед.	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
1 курс 2019-2020 уч.г.	Нач.	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
	Кон.	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
		п/зд	.	.	.	.	.	.	.	.	.	.	с	с	зд/сз	зд/сз	к	к	к	.	.	.	.	.	пп	пп	пп	пп	пп	с	к/сз	пп	пп	пп	пп	пп	./н	./н	./н	./н	./н	с	зд/сз	к/л	к/л	к/л	к/л	к/л	к/л	к	к	к	к

Период		Сентябрь				Октябрь					Ноябрь				Декабрь				Январь					Февраль				Март				Апрель					Май				Июнь				Июль					Август			
	Нед.	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
2 курс 2020-2021 у	Нача	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8	15	22	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23
	Кон.	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27
		П	н	н	н	н	н	н	н	н	н	н	с	с	сз	сз	к	к	к	н	н	н	н	н	н	н	н	н	н	с	к/сз	к/сз	н	н	н	н	н	н	н	н	н	н	с	с	к/л	к/л	к/л	к/л	к/л	к/л	к	к	к

Ш	Нед.	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
	Нача	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	17	21	28	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22
	Конец	3	10	17	24	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29	6	13	20	27	03	10	17	24	1	8	15	22	29	5	12	19	26
	2021-	П	н	н	н	н	н	н	н	н	н	н	с	с	сз	сз	к	к	к	н	н	н	н	н	н	н	н	н	н	с	к/сз	н	н	н	н	н	н	к/сз	иа	иа	иа	иа	иа	иа								

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Презентация	Теоретич. обуч.	Экзамен. сессия	Каникулы	Произв. практика	Летний сем.	Запись на дисц.	Сдача FX	Итоговая аттестация	НИРД
п	.	с	к	пп	л	зд	сз	иа	н

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

Annex 2. Working

Дайындық бағыты (мамандығы)/Направление подготовки (специальность)/Direction of training (specialty): Инженерия және инженерлік іс/Инженерия и инженерное дело/
Білім беру бағдарламасы (мамандандыру)/Образовательная программа (специализация)/Educational program (specialization): Техникалық жүйелерді басқару /Управление техническими системами /Control of technical systems
Оқу кезеңі/Период обучения/Period of study: 2019 - 2020
Дайындық деңгейі/Уровень образования/Level of training: /Магистр по направлениям/
Білім негізінде/На базе/On the base: Жоғарғы білім/Высшее образование/

№	Модуль атауы Наименование модуля Module name	Пәндер циклі Цикл дисциплин Cycle of disciplines	Компонент Компонент Component	Пәндер коды Код дисциплины Code of discipline	Пәндер атауы Наименование дисциплин Discipline name	КР кредит саны Число кредитов РК Number of KZ credits	Білім алушылардың барлық жұмыс уақыты (сағ) Бюджет рабочего времени обучающихся (в часах) Student budget-time (in hours)								Кредиттерді курс және семестр (триместр, квартал) бойынша бөлу Распределение кредитов по курсам и семестрам (триместрам, кварталам) Distribution of credits by courses and semesters (trimesters, quarters)			Бақылау түрі Формы контроля Forms of control	
							Барлық сағат саны Всего в часах Total (in hours)	Бюджеттік дәрісханалық сағат саны Всего аудиторных часов Total class hours	Дәрісханалық сабақтар Аудиторные занятия Class work						1 курс (year)			Емтихан/Экзамен Exam	Курстық жұмыс/Курсовая работа/Term paper
									Дәріс Лекции Lectures	Практикалық/семинарлық сабақтар Практические \ семинарские Practical classes\seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Студиялық сабақтар Студийные занятия Studio work	БАОӨЖ СРОП IWST	БАӨЖ СРО IWS	1	2	3		
															Триместрдегі апталар саны Недель в триместре Weeks per trimester				
															10	10	10		
1.Жалпы модульдер/1.Общие модули/1.Common modules																			
1	Гуманитарлық-әлеуметтік Гуманитарно-социальный Humanitarian-social	БП БД BS	ЖК ВК UC	PU5201	Басқару психологиясы Психология управления Psychology of management	2,00	60,00	20,00	10,00	10,00			8,00	32,00	2,00			Первый триместр	
		БП БД BS	ЖК ВК UC	IYaP5203	Шет тілі (кәсіби) Иностранный язык (профессиональный) Foreign language (professional)	2,00	60,00	20,00	10,00	10,00			8,00	32,00		2,00		Второй триместр	
Модуль бойынша барлығы:/Итого по модулю:/Total in module:						**4,00**	**120,00**	**40,00**	**20,00**	**20,00**			**16,00**	**64,00**	**2,00**	**2,00**		**2**	
2.Мамандық модульдері /2.Модули специальности/2.Specialty modules																			
1	Кәсіптік бағытталған Профессионально-ориентированный professionally-oriented	ЗЖ ИР RW		EIRMVVMD501	Магистрлік диссертацияны дайындау және эксперименталдық зерттеу жұмысы Экспериментально-исследовательская работа магистранта, включая выполнение магистерской диссертации/проекта Experimental research, including the master's thesis	13,00	390,00								4,00	6,00	3,00	Третий триместр, Второй триместр, Первый триместр	
		КП ПД PS	ЖК ВК UC	PP5301	Өндірістік тәжірибе Производственная практика Production practice	4,00	120,00									4,00		Второй триместр	
2	Кәсіптік Профессиональный Professional	БП БД BS	ТК КВ SC	UKE5202	Энергияның сапасын реттеу Управление качеством энергии Energy Quality Management	4,00	120,00	40,00	10,00	20,00	10,00		16,00	64,00	4,00			Первый триместр	
		КП ПД PS	ТК КВ SC	SU5302	Басқару жүйелер Системы управления Control systems	8,00	240,00	80,00	20,00	20,00	40,00		32,00	128,00		8,00		Второй триместр	
		КП ПД PS	ЖК ВК UC	OM5303	Мехатроника негіздері Основы мехатроники Fundamentals of Mechatronics	8,00	240,00	80,00	20,00	20,00	40,00		32,00	128,00	8,00			Первый триместр	
		БП БД BS	ТК КВ SC	E5204	Энергияны үнемдеу Энергосбережение Energy Saving	4,00	120,00	40,00	10,00	20,00	10,00		16,00	64,00	4,00			Первый триместр	
		КП ПД PS	ТК КВ SC	MTS5304	Техникалық жүйелерді модельдеу Моделирование технических систем Modeling of technical systems	8,00	240,00	80,00	20,00	20,00	40,00		32,00	128,00		8,00		Второй триместр	
		КП ПД PS	ЖК ВК UC	PNR5305	Жобалық және ғылыми жұмыс Проектная и научная работа Project and scientific work	5,00	150,00	50,00	20,00	20,00	10,00		20,00	80,00			5,00	Третий триместр	
3	Экономикалық-басқарушылық Экономико-управленческий Economic and managerial	БП БД BS	ЖК ВК UC	M5205	Менеджмент Менеджмент Managment	2,00	60,00	20,00	10,00	10,00			8,00	32,00	2,00			Первый триместр	
Модуль бойынша барлығы:/Итого по модулю:/Total in module:						**56,00**	**1 680,00**	**390,00**	**110,00**	**130,00**	**150,00**		**156,00**	**624,00**	**22,00**	**26,00**	**8,00**	**11**	
3.Таңдау бойынша модульдер/3.Модули по выбору/3.Optional modules																			
1	Кәсібиден алдын Надпрофессиональный Professionalny onlu	ҚА ИА FE		IGA501	Қорытынды мемлекеттік аттестаттау Итоговая государственная аттестация Final state certification	12,00	360,00										12,00	Третий триместр	

curriculum

Модуль бойынша барлығы:/Итого по модулю:/Total in module:	**12,00**	**360,00**										**12,00**	**1**	
Кредиттер бойынша барлығы:/Итого кредитов:/Total credits:	**72,00**	**2 160,00**	**430,00**	**130,00**	**150,00**	**150,00**		**172,00**	**688,00**	**24,00**	**28,00**	**20,00**	**14**	
Зерттеу жұмыстары:/Исследовательская работа:/Research work:	**13,00**	**390,00**								**4,00**	**6,00**	**3,00**	**3**	
ҚА кредиттерінің саны:/Количество кредитов ИА:/Number of credits in FE:	**12,00**	**360,00**										**12,00**	**1**	
Орташа апталық жүктеменің сағат саны:/Средняя недельная нагрузка в часах:/Weekly average workload at hours:										72,00	84,00	60,00		
БП кредиттерінің саны:/Количество кредитов БД:/Number of credits in BS:	**14,00**	**420,00**	**140,00**	**50,00**	**70,00**	**20,00**		**56,00**	**224,00**	**12,00**	**2,00**			
БП-інің ТК кредиттерінің саны:/Количество кредитов БД КВ:/Number of credits in BS SC:	8,00	240,00	80,00	20,00	40,00	20,00		32,00	128,00	8,00			2	
БП-інің ЖООК кредиттерінің саны:/Количество кредитов БД ВК:/Number of credits in BS UC:	6,00	180,00	60,00	30,00	30,00			24,00	96,00	4,00	2,00		3	
КП кредиттерінің саны:/Количество кредитов ПД:/Number of credits in majors:	**33,00**	**870,00**	**290,00**	**80,00**	**80,00**	**130,00**		**116,00**	**464,00**	**8,00**	**20,00**	**5,00**		
КП-інің ТК кредиттерінің саны:/Количество кредитов ПД КВ:/Number of credits in majors SC:	16,00	480,00	160,00	40,00	40,00	80,00		64,00	256,00		16,00		2	
КП-інің ЖООК кредиттерінің саны:/Количество кредитов ПД ВК:/Number of credits in majors UC:	17,00	390,00	130,00	40,00	40,00	50,00		52,00	208,00	8,00	4,00	5,00	3	

Дайындық бағыты (мамандығы)/Направление подготовки (специальность)/Direction of training (specialty): Инженерия және инженерлік іс/Инженерия и инженерное дело/
Білім беру бағдарламасы (мамандандыру)/Образовательная программа (специализация)/Educational program (specialization): Техникалық жүйелерді басқару /Управление техническими системами /Control of technical systems
Оқу кезеңі/Период обучения/Period of study: 2019 - 2021
Дайындық деңгейі/Уровень образования/Level of training: /Магистр по направлениям/
Білім негізінде/На базе/On the base: Жоғарғы білім/Высшее образование/

№	Модуль атауы Наименование модуля Module name	Пәндер циклі Цикл дисциплин Cycle of disciplines	Компонент Компонент Component	Пәндер коды Код дисциплины Code of discipline	Пәндер атауы Наименование дисциплин Discipline name	КР кредит саны Число кредитов РК Number of KZ credits	Білім алушылардың барлық жұмыс уақыты (сағ) Бюджет рабочего времени обучающихся (в часах) Student budget-time (in hours)								Кредиттерді курс және семестр (триместр, квартал) бойынша бөлу Распределение кредитов по курсам и семестрам (триместрам, кварталам) Distribution of credits by courses and semesters (trimesters, quarters)			Кредиттерді курс және семестр (триместр, квартал) бойынша бөлу Распределение кредитов по курсам и семестрам (триместрам, кварталам) Distribution of credits by courses and semesters (trimesters, quarters)			Бақылау түрі Формы контроля Forms of control	
							Барлық сағат саны Всего в часах Total (in hours)	Бақылық дәрісханалық сағат саны Всего аудиторных часов Total class hours	Дәрісханалық сабақтар Аудиторные занятия Class work					БАОӨЖ СРОП IWST	БӨЖ СРО IWS	1 курс (year)			2 курс (year)			Емтихан Экзамен Exam	Курстық жұмыс Курсовая работа Term paper
									Дәрістер Лекции Lectures	Практикалық/семинарлық сабақтар Практические / семинарские Practical classes/seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Студиялық сабақтар Студийные занятия Studio work				1	2	3	1	2	3		
																Триместрдегі апталар саны Недель в триместре Weeks per trimester			Триместрдегі апталар саны Недель в триместре Weeks per trimester				
																10	10	10	10	10	10		
1.Жалпы модульдер/1.Общие модули/1.Common modules																							
1	Гуманитарлық-әлеуметтік Гуманитарно-социальный Humanitarian-social	БП БД BS	ЖК ВК UC	PUS202	Басқару психологиясы Психология управления Psychology of management	2,00	60,00	20,00	10,00	10,00			8,00	32,00	2,00						Первый триместр	
		БП БД BS	ЖК ВК UC	IYaP5204	Шет тілі (кәсіби) Иностранный язык (профессиональный) Foreign language (professional)	2,00	60,00	20,00	10,00	10,00			8,00	32,00		2,00					Второй триместр	
Модуль бойынша барлығы:/Итого по модулю:/Total in module:						**4,00**	**120,00**	**40,00**	**20,00**	**20,00**			**16,00**	**64,00**	**2,00**	**2,00**					**2**	
2.Мамандық модульдері /2.Модули специальности/2.Specialty modules																							
1	Кәсіптік бағытталған Профессионально-ориентированный professionally-oriented	ЗЖ ИР RW		EIRMVVMD601	Магистрлік диссертацияны дайындау және эксперименталдық зерттеу жұмысы Экспериментально-исследовательская работа магистранта, включая выполнение магистерской диссертации/проекта Experimental research, including the master's thesis	18,00	540,00								5,00	4,00	1,00	8,00			Третий триместр, Второй триместр, Первый триместр, Четвертый триместр	
		КП ПД PS	ЖК ВК UC	PP5301	Өндірістік тәжірибе Производственная практика Production practice	6,00	180,00										6,00				Третий триместр	
2	Экономикалық-басқарушылық Экономико-управленческий Economic and managerial	БП БД BS	ТК КВ SC	EOPP5201	Өндірістік өнеркәсіптерді ұйымдастыру және экономикасы Экономика и организация производственных предприятий Economics and organization of industrial enterprises	4,00	120,00	40,00	20,00	20,00			16,00	64,00	4,00						Первый триместр	
		БП БД BS	ТК КВ SC	EOEP5203	Энергетикалық кәсіпорындарының экономикасы және ұйымдастыру Экономика и организация энергетических предприятий Economics and organization of electrical power plants	4,00	120,00	40,00	20,00	20,00			16,00	64,00	4,00						Первый триместр	
		БП БД BS	ЖК ВК UC	M5205	Менеджмент Менеджмент Managment	2,00	60,00	20,00	10,00	10,00			8,00	32,00	2,00						Первый триместр	
		БП БД BS	ТК КВ SC	UK5206	Сапаны реттеу Управление качеством Quality Management	5,00	150,00	50,00	20,00	30,00			20,00	80,00			5,00				Третий триместр	
		БП БД BS	ТК КВ SC	UP5207	Жобаларды басқару Управление проектами Project management	5,00	150,00	50,00	20,00	30,00			20,00	80,00			5,00				Третий триместр	
3	Кәсіптік Профессиональный Professional	КП ПД PS	ТК КВ SC	UKE5302	Энергияның сапасын реттеу Управление качеством энергии Energy Quality Management	7,00	210,00	70,00	20,00	30,00	20,00		28,00	112,00	7,00						Первый триместр	
		КП ПД PS	ЖК ВК UC	SU5303	Басқару жүйелер Системы управления Control systems	8,00	240,00	80,00	20,00	20,00	40,00		32,00	128,00		8,00					Второй триместр	
		КП	ТК		Энергияны үнемдеу																		

		ПД PS	КВ SC	E5304	Энергосбережение Energy Saving	7,00	210,00	70,00	20,00	30,00	20,00		28,00	112,00	7,00						Первый триместр	
		КП ПД PS	ЖК ВК UC	OM5305	Мехатроника негіздері Основы мехатроники Fundamentals of Mechatronics	8,00	240,00	80,00	20,00	20,00	40,00		32,00	128,00			8,00				Третий триместр	
		КП ПД PS	ТК КВ SC	MTS5306	Техникалық жүйелерді модельдеу Моделирование технических систем Modeling of technical systems	6,00	180,00	60,00	20,00	20,00	20,00		24,00	96,00		6,00					Второй триместр	
		КП ПД PS	ЖК ВК UC	PNR6307	Жобалық және ғылыми жұмыс Проектная и научная работа Project and scientific work	10,00	300,00	90,00	40,00	40,00	10,00		40,00	170,00				10,00			Четвертый триместр	
		КП ПД PS	ТК КВ SC	RIZ5308	Инженерлік есептерді шешу Решение инженерных задач Solving engineering problems	6,00	180,00	60,00	20,00	20,00	20,00		24,00	96,00		6,00					Второй триместр	
Модуль бойынша барлығы:/Итого по модулю:/Total in module:						**96,00**	**2 880,00**	**710,00**	**250,00**	**290,00**	**170,00**		**288,00**	**1 162,00**	**29,00**	**24,00**	**25,00**	**18,00**			**17**	
3.Таңдау бойынша модульдер/3.Модули по выбору/3.Optional modules																						
1	Кәсіптен алдын Надпрофессиональный Professionalnyonlu	ҚА ИА FE		IGA601	Қорытынды мемлекеттік аттестаттау Итоговая государственная аттестация Final state certification	12,00	360,00												12,00		Пятый триместр	
Модуль бойынша барлығы:/Итого по модулю:/Total in module:						**12,00**	**360,00**												**12,00**		**1**	
Кредиттер бойынша барлығы:/Итого кредитов:/Total credits:						**112,00**	**3 360,00**	**750,00**	**270,00**	**310,00**	**170,00**		**304,00**	**1 226,00**	**31,00**	**26,00**	**25,00**	**18,00**	**12,00**		**20**	
Зерттеу жұмыстары:/Исследовательская работа:/Research work:						**18,00**	**540,00**								**5,00**	**4,00**	**1,00**	**8,00**			**4**	
ҚА кредиттерінің саны:/Количество кредитов ИА:/Number of credits in FE:						**12,00**	**360,00**												**12,00**		**1**	
Орташа апталық жүктеменің сағат саны:/Средняя недельная нагрузка в часах:/Weekly average workload at hours:															**93,00**	**78,00**	**75,00**	**54,00**	**36,00**			
БП кредиттерінің саны:/Количество кредитов БД:/Number of credits in BS:						**24,00**	**720,00**	**240,00**	**110,00**	**130,00**			**96,00**	**384,00**	**12,00**	**2,00**	**10,00**					
БП-інің ТК кредиттерінің саны:/Количество кредитов БД КВ:/Number of credits in BS SC:						18,00	540,00	180,00	80,00	100,00			72,00	288,00	8,00		10,00				4	
БП-інің ЖООК кредиттерінің саны:/Количество кредитов БД ВК:/Number of credits in BS UC:						6,00	180,00	60,00	30,00	30,00			24,00	96,00	4,00	2,00					3	
КП кредиттерінің саны:/Количество кредитов ПД:/Number of credits in majors:						**58,00**	**1 560,00**	**510,00**	**160,00**	**180,00**	**170,00**		**208,00**	**842,00**	**14,00**	**20,00**	**14,00**	**10,00**				
КП-інің ТК кредиттерінің саны:/Количество кредитов ПД КВ:/Number of credits in majors SC:						26,00	780,00	260,00	80,00	100,00	80,00		104,00	416,00	14,00	12,00					4	
КП-інің ЖООК кредиттерінің саны:/Количество кредитов ПД ВК:/Number of credits in majors UC:						32,00	780,00	250,00	80,00	80,00	90,00		104,00	426,00		8,00	14,00	10,00			4	

Annex 3. Description of university obligatory component disciplines

1. Basic information about the discipline:	
Name of discipline	History and philosophy of science
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	The structure of scientific knowledge, methods of scientific research, functions of scientific theories and laws; expanding philosophical horizons; the development of ideas about the criteria of science and the requirements that must be met by scientific study and its results, as well as to develop scientific thinking style based on the study of history and philosophy of science.

1. Basic information about the discipline:	
Name of discipline	Management psychology
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	Conceptual apparatus. Head and team. Conflicts. Management communication. Decision-making technology. The concept of the subject and object of management. The Manager and the leader. Psychology of the order. Democratic leadership style and its features. Psychology of criticism. Psychotypes of subjects of communication. Psychological problems of training and retraining of management personnel. Selection and placement of personnel. Personnel rotation.

1. Basic information about the discipline:	
Name of discipline	Foreign language (professional)
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	The mastering in the language for professional and academic purposes at an advanced level, which will operate freely with the scientific conceptual apparatus specialty, to expand the scientific information base, acquire the skills of interpreting scientific information, argument, persuasion, scientific debate, academic writing

1. Basic information about the discipline:	
Name of discipline	Pedagogy of higher education
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	Fundamentals of higher school pedagogy. Subject and tasks of pedagogy of higher school. Methodology and methods of pedagogical research in higher education. Higher school didactics. Pedagogical process in higher school. Laws, regularities and principles of training. Methods, forms and means of education in higher education. The current state of higher education in Kazakhstan.

1. Basic information about the discipline:	
Name of discipline	Management
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	The ability to make decisions, "predict, plan, organize, coordinate and control", motivate, lead different groups of people-training these skills that are necessary for managers, future leaders of companies for effective business and management.

1. Basic information about the discipline:	
Name of discipline	Pedagogical practice

2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	Professional formation of the teacher of the higher school. The process of education in high school. The purpose of education as a pedagogical problem. Educational staff as a form of functioning of the holistic pedagogical process.

1. Basic information about the discipline:	
Name of discipline	Control system
2. Prerequisites:	-
3. Post-requisites:	Fundamentals of mechatronics
4. The content of the discipline	Consideration of software control systems. Construction of multilevel automatic control systems. Interconnected work of technical means. Study of production conditions of operation of control and management systems. Rational choice and use of control and management systems, design, and implementation in production, taking into account individual characteristics. Consideration of issues of reliable and efficient operation of control and management systems.

1. Basic information about the discipline:	
Name of discipline	Fundamentals of mechatronics
2. Prerequisites:	Control system
3. Post-requisites:	Project and scientific work
4. The content of the discipline	Fundamentals of automated mechatronic systems and devices construction. The role of computers as an element of the device management system. A systematic approach to the creation of complex technical objects. Devices for obtaining information about the state of the managed process. Actuators and devices of automated control systems. Features of Executive mechanisms of computer systems

1. Basic information about the discipline:	
Name of discipline	Research practice
2. Prerequisites:	-
3. Post-requisites:	Project and scientific work
4. The content of the discipline	Strategic processing of various sources of information about methods and object of research. Search for competent experts and consultation with them on the methods and object of research. Collection of information about the methods and object of research, covering the expanses of the world wide web. Collection of information on the solution of similar problems by other researchers. Preparation of materials for the experiment.

1. Basic information about the discipline:	
Name of discipline	Project and scientific work
2. Prerequisites:	Fundamentals of mechatronics
3. Post-requisites:	-
4. The content of the discipline	Study of design principles with the possibility of covering the maximum number of influencing factors. Practice of application of techniques of the modern equipment at electrification of objects taking into account system factors. Ability to comprehensively implementing design and research issues, taking into account technical requirements and economic justification. Ability to comprehensively systematizing information about the object and conditions of electrification.

1. Basic information about the discipline:

Name of discipline	Manufacturing practice
2. Prerequisites:	-
3. Post-requisites:	Project and scientific work
4. The content of the discipline	A clear definition of the problem and the way of its mathematical formulation. Construction of the procedure for designing and planning the necessary actions for the experiment. Search for information to form the conditions and content of the experiment. Determination of the type of the final result when planning the conditions of the experiment for further correction in its implementation. Formation of a report on the results of the results obtained.

Annex 4. Description of elective component disciplines

1. Basic information about the discipline:	
Name of discipline	Economy and organization of production enterprises
2. Prerequisites:	-
3. Post-requisites:	Business process modeling and management, project Planning and evaluation
4. The content of the discipline	Quality, competitiveness, standardization and certification of products. The marketing approach to business activities. Production process and types of production. Calculation of the production cycle and plotting the types of movement. Scientific and technical preparation of production. Organization and management of material, technical and labor potential of the enterprise. Subject, methods and tasks of management study. Risk in business and the threat of bankruptcy.

1. Basic information about the discipline:	
Name of discipline	Economics and organization of energy enterprises
2. Prerequisites:	-
3. Post-requisites:	Business process modeling and management, project Planning and evaluation
4. The content of the discipline	Economic features of energy. Energy in the system of productive forces of the national economy. Costs and Prime cost of energy product. Pricing in the energy market. Profit and profitability in the energy sector. Production funds of energy, laws of their development, use and reproduction. Organization of sales of electric energy and energy saving. Methods of determination and ways to improve energy efficiency.

1. Basic information about the discipline:	
Name of discipline	Business process modeling and management
2. Prerequisites:	Economics and organization of energy enterprises, Economics and organization of production enterprises
3. Post-requisites:	-
4. The content of the discipline	Prerequisites for the formation of new approaches to the organization of the enterprise. The concept of business process. Process approach and process-oriented organization. Theoretical foundations of business process management. Main approaches and standards to business process modeling. Business process modeling methodologies. Business process modeling software. Methods of description of various subject areas of the organization. Methods of analysis of business processes. Controlling and monitoring processes.

1. Basic information about the discipline:	
Name of discipline	Project planning and evaluation
2. Prerequisites:	Economics and organization of energy enterprises, Economics and organization of production enterprises
3. Post-requisites:	-
4. The content of the discipline	Theoretical aspects of project management. The concept of the project, its main characteristics. The concept of project efficiency. The main provisions of modern methodology. Organization of collection and preparation of initial information for project analysis. Evaluation of the financial efficiency of the project. Assessment of economic efficiency of the project. Take into account

	factors of uncertainty and risk. Software for analysis of project effectiveness.

1. Basic information about the discipline:	
Name of discipline	Quality management
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	Principles of quality assurance and product quality management. Evolution of product quality assurance methods. Quality management functions. The main methods of measurement of product quality. Procedure and methods of product quality assessment. Competitiveness of goods and services as a measure of enterprise profit. Statistical methods of quality control and management. Legal basis of certification in the Republic of Kazakhstan.

1. Basic information about the discipline:	
Name of discipline	Project management
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	The basics of project management. Project management as a special type of management. Time management of the project. Marketing of the project. Organizational structures of project management. Project team management. Financial management of the project. Project financing and risk management. Project quality management. The completion of the project and the dissolution of the team

1. Basic information about the discipline:	
Name of discipline	Energy quality management
2. Prerequisites:	-
3. Post-requisites:	Project and scientific work
4. The content of the discipline	Definition of indicators of quality of energy, the reasons causing their violation. Study of operating modes of electrical installations and consumers. Determination of degree of influence of deviation of indicators of quality of the electric power on technical and economic indicators. Study of organizational measures and technical means to normalize the quality of electricity. Influence of indicators of quality of the electric power on reliability and continuity of power supply.

1. Basic information about the discipline:	
Name of discipline	Energy saving
2. Prerequisites:	-
3. Post-requisites:	Project and scientific work
4. The content of the discipline	Consideration of energy saving issues in the design. Definition of the factors causing the greatest irrational losses of electric and thermal energy. Search for ways to reduce the loss of electricity and heat, the study of practical approaches to their implementation. Development of a plan for energy audit and compliance with energy management.

1. Basic information about the discipline:	
Name of discipline	Modeling of technical systems
2. Prerequisites:	-
3. Post-requisites:	Project and scientific work
4. The content of the discipline	Analytical modeling of technical systems. Simulation of technical systems and objects. Modeling and calculations of automatic control systems. Application of methods of optimization of design decisions by results of modeling.

1. Basic information about the discipline:	
Name of discipline	Problem solving in engineering
2. Prerequisites:	-
3. Post-requisites:	Project and scientific work
4. The content of the discipline	Mathematical interpretation of the problem should be solved. Identification of influencing factors and consideration of technical limitations. The choice of mathematical apparatus for solving the problem. Formation of stages of problem solving. Formation of an ideal final result. Formulation of physical contradictions. Analysis of the obtained solutions.