

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
"02" "03" 2019



EDUCATIONAL PROGRAM

7M08705, 7M08706 ,7M08707 " Energy supply and automation of agriculture»
(program name)

Education area code and classification
Code and classification of training areas
the International standard classification of
education code
Degree awarded

7M08 Agriculture and bioresources
7m085 agricultural Engineering
0731

Period of study
Form of training
Language of instruction

Master of agricultural Sciences / master
of agriculture
2; 1.5; 1 years
intramural
state / Russian

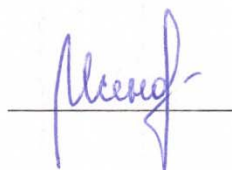
Group of authors:

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The author's team was approved by the order of JSC " KATU.S. Seifullina " 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 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

operation of electrical equipment department

 Sarsikeev E. Zh.

Content of the educational program

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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 Organize effective and stress-resistant work performed individually or collectively to solve professional problems, plan and evaluate the results of work.
2. To Collect, process, analyze and systematize information on the subject of research, use the achievements of science, technology and technology in their professional activities, communicate and Express their thoughts in a foreign language in a professional environment, scientifically argue and convince in justifying decisions.
3. To use the methods of modern economic theory in assessing the effectiveness of developed and researched systems and devices, as well as the results of their professional activities.
4. To Create physical, mathematical and computer models of objects of professional activity, apply mathematical methods in solving engineering problems, use modern software products.
5. To design objects of professional activity, their systems and elements, to calculate and define parameters and indicators, to investigate and form rational modes of equipment operation, to analyze and evaluate the introduction of new technologies.
6. To carry out theoretical and experimental researches in objects of professional activity, to plan and organize work on service, operation and repair of the equipment, to control and estimate a technical condition of the equipment, to develop recommendations, to make analytical reports on theoretical or experimental work.

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 experts 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 student chooses one of that 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.

- * Training profile "energy supply of agriculture" was developed with the support of international projects of the European Union Tempus.

- * 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.

2.4 the Potential of the profession (office)

- * Electrical engineer.

- * Power engineer.

- * Test and commissioning engineer.

- * Reliability operation engineer.

- * Head of the laboratory.

- * Shift supervisor.

- * Head of service of the chief power engineer.

3.1 Areas of professional activity

- * Transmission, distribution and application of electricity, heat and gas.
- * Power supply systems of agricultural enterprises, settlements.
- * Power plants, power plants and complexes based on renewable energy sources.
- * Electrical and electronic devices, devices and process control systems.
- * Electrical insulating materials, constructions and means of their diagnostics. Electrical machines, transformers, Electromechanical 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

Master 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 of agricultural production, as well as elements and automation devices;

production and technological activity: development of standards, technological standards; selection of equipment and tooling; evaluation of efficiency of technological processes, innovation and technological risks in implementing new equipment and technologies; development of measures on efficient use of energy and raw materials; the choice of methods and means of ecological safety of production;

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;

service and operational activities: organization of operation and repair of power and process equipment;

educational and pedagogical: teaching energy disciplines in secondary technical vocational schools;

research: experimental and development work in the systems of energy supply and automation of agricultural production.

3.3 General education competences

- * To Use the basics of philosophical knowledge to form a worldview.
- * To Analyze the main stages and patterns of historical development of society to form a civic position.
- * To Use the basics of economic knowledge in various spheres of life.
- * To Use the basics of legal knowledge in various spheres of life.
- * To be able to communicate orally and in writing in the state or Russian and foreign languages to solve problems of interpersonal and intercultural interaction.
- * Work in a team, tolerant of social, ethnic, religious and cultural differences.
- * To be able to self-organization and self-education.

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 Use modern tools to perform and edit images and drawings and prepare the necessary documentation.
- * To Use basic methods of processing and presentation of experimental data.
- * To search, store, process and analyze information from various sources and databases, to present it in the required format using information, computer and network technologies.
- * To Take into account the current trends in the development of electronics, measuring and computer technology, information technology in their professional activities.
- * To carry out prevention of industrial injuries, occupational diseases, prevention of environmental violations.

3.5 Professional competence

- * To Analyze and calculate parameters of power supply and automation systems.
- * To make calculations and design of separate knots, devices and in General systems of power supply and automation of agricultural production, to choose the existing equipment according to the specification.
- * To Develop project documentation in accordance with existing standards and specifications.
- * To set up and repair means and complexes of power supply and automatics, to carry out their routine maintenance with use of the corresponding tools.
- * To monitor and diagnose the technical condition of the equipment, to carry out its preventive maintenance.
- * To Perform installation and configuration of system, application and tool software of automation systems.
- * To Develop instructions for service personnel on the operation of the technical equipment and software used.
- * To Perform tasks in the field of certification of technical means, systems, processes, equipment and materials.

4 Base of passing of professional practices

"Rodina" Agrofirma, Baisereke-agro, Kaznii of mechanization and electrification of agriculture, Ak-mola 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, Iaim Group Astana, Master plan KZ, Astana engineering Corporation.

5 structure of the educational program
Scientific and pedagogical magistracy (term of study 2 years)

№	Name of complexes and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	Complexes of basic disciplines (DB)	1500	50
1)	High school component	600	20
	History and philosophy of science	150	5
	Management psychology	150	5
	Foreign language (professional)	150	5
	Pedagogy of higher education	90	3
	Pedagogical practice	60	2
2)	Optional component	900	30
	Special issues of electrical engineering in agriculture	150	5
	Special issues of Agroengineering systems	150	5
	Business process modeling and management	150	5
	Project planning and evaluation	150	5
	Special issues of power supply of agriculture	150	5
	Special issues of heat and gas supply of agriculture	150	5
2	Complexes of profile disciplines (PD)	1860	62
1)	University component and (or) optional Component	1080	36
	Control system	240	8
	Design of SCADA systems	240	8
	Research practice	300	10
	Project and scientific work	300	10
2)	Optional component	780	26
	Special issues of operation of electrical equipment agribusiness	210	7
	Electrical equipment of agroindustrial complex	210	7
	Modeling of technical systems	180	6
	Problem solving in engineering	180	6
4	Research work of a masters student, including internship and execution of a master's thesis	720	24
5	End of course certification	360	12
1)	Preparation and defense of master's thesis	360	12
	Subtotal	4440	148

Profile magistracy (term of training 1,5 years)

№	Name of complexes and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	Complexes of basic disciplines (DB)	720	24
1)	High school component	180	6
	Management psychology	60	2
	Foreign language (professional)	60	2
	Management	60	2
2)	Optional component	540	18
	Special issues of electrical engineering in agriculture	120	4
	Special issues of Agroengineering systems	120	4
	Special issues of power supply of agriculture	150	5
	Special issues of heat and gas supply of agriculture	150	5
2	Complexes of profile disciplines (PD)	1740	58
1)	University component and (or) optional Component	960	32
	Control system	240	8
	Design of SCADA systems	240	8
	Project and scientific work	300	10
	Manufacturing practice	180	6
2)	Optional component	780	26
	Special issues of operation of electrical equipment agribusiness	210	7
	Electrical equipment of agroindustrial complex	210	7
	Modeling of technical systems	180	6
	Problem solving in engineering	180	6
3	Experimental and research work of a master's student, including internship and implementation of a master's project	540	18
4	End of course certification	360	12
1)	Registration and protection of the master's project	360	12
	Subtotal	3360	112

Relevant master's degree (term of training 1 year)

№	Name of complexes and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	Complexes of basic disciplines (DB)	420	14
1)	High school component	180	6
	Management psychology	60	2
	Foreign language (professional)	60	2
	Management	60	2
2)	Optional component	240	8
	Special issues of operation of electrical equipment agribusiness	120	4
	Electrical equipment of agroindustrial complex	120	4
2	Complexes of profile disciplines (PD)	990	33
1)	University component and (or) optional Component	510	17
	Design of SCADA systems	240	8
	Manufacturing practice	120	4
	Project and scientific work	150	5
2)	Optional component	480	16
	Control system	240	8
	Modeling of technical systems	240	8
3	Experimental and research work of a master's student, including internship and implementation of a master's project	390	13
4	End of course certification	360	12
1)	Registration and protection of the master's project	360	12
	Subtotal	2160	72

calendar

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

Академический календарь на 2019-2021 учебные годы

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

Образовательные программы: Энергообеспечение и автоматизация сельского хозяйства, Управление техническими системами
Срок обучения: 2 года

[illegible]

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																																													
Пн:	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																																													
Вт:	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																																													
Ср:	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	1	8	15	22	29	5	12	19	26	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28																																												
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Пт:	7	14	21	28	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	1	8	15	22	29	5	12	19	26	6	13	20	27	4	11	18	25	1	8	15	22																																													
Сб:	8	15	22	29	5	12	19	26	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11	18	25	1	8	15	22	29	5	12	19	26																																												
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*НИРМ в период теоретического обучения

Презентация	Теоретич.	Экзамен.	Каникулы	Исслед.	Педаг.	Летний сем.	Запись на дисп.	Сдача ГХ	Итоговая аттестация	НИРМ
п	б	с	к	практика ип	практика пп	л	зд	сз	на	и

Праздничные дни

День знаний
 День независимости РК
 Новый год
 День Конституции РК

1 септембра
16 - 17 декембра
1-2 январа
30 августа

Международный женский день
Праздник "Наурыз"
День единства народов Казахстана
День защитника Отечества
День Победы

8 марта
21-23 марта
1 мая
7 мая
9 мая

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"
" _____ " _____ 2019 г. Н.А.Серекпаев

Академический календарь на 2019-2021 учебные годы
Образовательные программы: Энергообеспечение и автоматизация сельского хозяйства, Управление техническими системами
Срок обучения: 1,5 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
	Пач.	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	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	с	с	зд/сз	зд/сз	к	к	к	/э	/э	/э	/э	/э	/э	/э	/э	/э	с	к/сз	пп	пп	пп	пп	пп	пп	/э	/э	/э	/э	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						
	Нач.	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	1	8	15	22	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27						
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*ЭИРМ в период теоретического обучения

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

Праздничные дни

День знаний
День независимости РК
Новый год
День Конституции РК

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1-2 января
30 августа

Международный женский день
Праздник "Наурыз"
День единства народов Казахстана
День защитника Отечества
День Победы

8 марта
21-23 марта
1 мая
7 мая
9 мая

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Казахский агротехнический университет им. С.Сейфуллина

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Образовательные программы: Энергообеспечение и автоматизация сельского хозяйства, Управление техническими системами
Срок обучения: 1 год

1 кув. 2013 2013-2014	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
	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	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	с	с	зд/сз	к	пш	пп	пп	пп	пп	/э	/э	/э	/э	/э	/э	/э	с	к/сз	/э	/э	/э	/э	/э	/э	с	иа	иа	иа	иа	иа	иа									

*ЭИРМ в период теоретического обучения

Презентация	Теоретич. обуч.	Экзамен. сессия	Каникулы	Исслед. практика	Произв. практика	Летний сем.	Запись на дисц.	Сдача ГХ	Итоговая аттестация	ЭИРМ
п	.	с	к	ип	пп	л	зд	сз	иа	э

Праздничные дни

День знаний
День независимости РК
Новый год
День Конституции РК

1 сентября
16 - 17 декабря
1-2 января
30 августа

Международный женский день
Праздник "Наурыз"
День единства народов Казахстана
День защитника Отечества
День Победы

8 марта
21-23 марта
1 мая
7 мая
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	Пәнаралық цикл дисциплин Cycle of disciplines	Компетент Competent	Пәнаралық код дисциплин Code of discipline	Пәнаралық атауы Наименование дисциплины Discipline name	ҚР кредит саны Число кредитов РК Number of ECTS credits	Білім алушылардың барлық жұмыс уақыты (сағ) Бюджет рабочего времени обучающихся (в часах) Student budget-time (in hours)										Кредиттері 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)	Барлық пәнаралық сағат саны Всего аудиторных часов Total class hours	Дарсханалық сабақтар Аудиторные занятия Class work					BAӨБЖ СРОП ИWT BAӨЖ СРО ИWS								
									Дарс Lectures	Практикалық/семинарлар Практические/семинары Practical classes/seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Сызуалық сабақтар Студендік сабақтар Studio work										
1.Жалпы модульдер/1.Общие модули/1.Common modules																						
1	Гуманитарлық-әлеуметтік Гуманитарно-социальный Humanitarian-social	БП БД BS	ЖК БК UC	PUS201	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 БК UC	ГҮаР5203	Шет тіл (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	3Ж ИР RW		ЕИРМ/VVM D501	Магистрлік диссертацияны дайындау және эксперименталды 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 БК 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	Энергиялық сапалық 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	SUS302	Басқару жүйелері 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 БК 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	MTS304	Техникалық жүйелерді моделдеу 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 БК UC	PNR5305	Жобалау 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 БК UC	M5205	Менеджмент Менеджмент Management	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	Кәсіби деңгейдегі Надпрофессиональный Professionally only	КА 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	
Кредитор 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	
КА кредиттерінің саны/Количество кредитов КА/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	64,00	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	Пәнаралық цикл Цикл дисциплин Cycle of disciplines	Компонент Компонент Component	Пәнаралық код Код дисциплины Code of discipline	Пәнаралық атауы Наименование дисциплины Discipline name	ҚР кредит саны Число кредитов РК Number of ECTS credits	Білім алушылардың барлық жұмыс уақыты (сәт) Бюджет рабочего времени обучающихся (в часах) Student budget-time (in hours)										Кредиттері курс және семестр (триместр, квартал) бойынша бөлу Распределение кредитов по курсам и семестрам (триместрам, кварталам) Distribution of credits by courses and semesters (trimesters, quarters)			Кредиттері 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)	Бюджет лекционных сағат саны Всего аудиторных часов Total class hours	Лекция Lectures	Практикалық сабақтар Практические семинары Practical classes/seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Студиялық сабақтар Студийные занятия Studio work	БАОБЖ СРОП IVST	БАОБЖ СРОП IVST	БАОБЖ СРОП IVST	БАОБЖ СРОП IVST								
																	1	2	3	1	2	3		
																	Триместрлердегі апталар саны Недель в триместре Weeks per trimester			Триместрлердегі 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 БК 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 БК UC	ГуАР5204	Шет тіл (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 бағыттаған Профессионально-ориентированный professionally-oriented	ЖК ПД RW		ЕРММVM D601	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 БК 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	ЕОРР5201	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	ЕОЕР5203	Энергетикалық кәсіпорындардың 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 БК UC	MS205	Менеджмент Менеджмент Management	2,00	60,00	20,00	10,00	10,00			8,00	32,00	2,00								Первый триместр	
		БП БД BS	ТК КВ SC	UKS206	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 БК UC	SUS303	Басқару жүйелері 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	KB 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 БК UC	OM5305	Мехатроника негидро 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 KB SC	MTS5306	Техникалық жүйелерді моделдеу 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 БК UC	PNR6307	Жобалар 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 KB UC	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	Кәсіби деңгейдегі Надпрофессиональный Professional only	КА 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	
КА кредиттерінің саны/Количество кредитов КА/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 KB/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 BK/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 KB/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 BK/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	

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 научно-педагогическому направлению/
 Білім негізінде/На базе/On the base: Жоғарғы білім/Высшее образование/

№	Модуль атауы Наименование модуля Module name	Пәндер циклі Cycle of disciplines	Компонент Component	Пәндер коды Code of discipline	Пәндер атауы Наименование дисциплины Discipline name	КР кредит саны Число кредитов КР Number of KZ credits	Білім алушылардың барлық жұмыс уақыты (сағ) Бюджет рабочего времени обучающихся (в часах) Student budget-time (in hours)										Кредиттері курс және семестр (триместр, квартал) бойынша бөлу Распределение кредитов по курсам и семестрам (триместрам, кварталам) Distribution of credits by courses and semesters (trimesters, quarters)			Кредиттері 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)	Дірісханалық сабақтар Аудиторные занятия Class work					БАОБЖ СРОП IVST	БАОЖ СРО IVS										
								Дәрістер Лекции Lectures	Практикалық/семинарлық сабақтар Практические / семинары Practical classes/seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Студиялық сабақтар Студийные занятия Studio work													
												1 курс (year)			2 курс (year)									
							1	2	3	1	2	3	Триместрлердегі апталар саны Недель в триместре Weeks per trimester			Триместрлердегі 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 БК UC	IFNS201	Ғылым тарихы және философиясы История и философия науки History and philosophy of science	5,00	150,00	50,00	20,00	30,00		20,00	80,00	5,00				Первый триместр						
		БП БД BS	ЖК БК UC	PUS204	Басқару психологиясы Психология управления Psychology of management	5,00	150,00	50,00	20,00	30,00		20,00	80,00	5,00				Первый триместр						
		БП БД BS	ЖК БК UC	ГҮАР5205	Шет тіл (кәсіби) Иностраный язык (профессиональный) Foreign language (professional)	5,00	150,00	50,00	20,00	30,00		20,00	80,00	5,00				Первый триместр						
		БП БД BS	ЖК БК UC	PVSh5208	Жоғары мектеп педагогикасы Педагогика высшей школы Pedagogics of higher school	3,00	90,00	30,00	10,00	20,00		12,00	48,00		3,00			Второй триместр						
Модуль бойынша барлығы/Итого по модулю/Total in module:						18,00	540,00	180,00	70,00	110,00		72,00	288,00	15,00	3,00			4						
2.Мамандық модульдері /2.Модули специальности/2.Specialty modules																								
1	Кәсіптік Профессиональный Professional	КП ПД PS	ТК КВ SC	UKE6301	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		Четвертый триместр					
		КП ПД PS	ЖК БК UC	SUS302	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	ТК КВ SC	E6303	Энергияны үнемдеу Энергосбережение Energy Saving	7,00	210,00	70,00	20,00	30,00	20,00		28,00	112,00			7,00		Четвертый триместр					
		КП ПД PS	ЖК БК UC	OMS304	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	MTS6305	Техникалық жүйелерді моделдеу Моделирование технических систем Modeling of technical systems	6,00	180,00	136,00	20,00	20,00	96,00		20,00	24,00			6,00		Четвертый триместр					
		КП ПД PS	ЖК БК UC	PNR6306	Жобалау және ғылыми жарнама 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		Пятый триместр					
		КП ПД PS	ТК КВ SC	RIZ6307	Инженерлік есептерді шешу Решение инженерных задач Solving engineering problems	6,00	180,00	64,00	20,00	20,00	24,00		96,00	20,00			6,00		Четвертый триместр					
2	Кәсіптік бағытталған Профессионально-ориентированный professionally-oriented	3.Ж ИР RW		NIRMVVM D601	Магистранттың ғылыми-зерттеу жарнасы, магистрлік диссертацияның орындауының жосы Научно-исследовательская работа магистранта, включая выполнение магистерской диссертации MS student's research work, incl. Master thesis	24,00	720,00								2,00		7,00	7,00	8,00	Второй триместр, Четвертый триместр, Шестой триместр, Пятый триместр				
		КП ПД	ЖК БК	IP6308	Зерттеу тәжірибесі Исследовательская практика	10,00	300,00									7,00		3,00		Третий триместр, Пятый				

		PS	UC		Research practice															----- триместр		
		БП БД BS	ЖК БК UC	PP5210	Педагогикалық тәжірибе Педагогическая практика Teaching practice	2,00	60,00							2,00						Второй триместр		
3	Экономикалық-басқарушылық Экономико-управленческий Economic and managerial	БП БД BS	ТК КВ SC	EOPP5202	Бизнес-процестердің ұйымдастыру және экономикасы Экономика и организация производственных предприятий Economics and organization of industrial enterprises	5,00	150,00	50,00	20,00	30,00			20,00	80,00	5,00					Первый триместр		
		БП БД BS	ТК КВ SC	EOEP5203	Энергетикалық кәсіпорындардың экономикасы және ұйымдастыру Экономика и организация энергетических предприятий Economics and organization of electrical power plants	5,00	150,00	50,00	20,00	30,00			20,00	80,00	5,00					Первый триместр		
		БП БД BS	ТК КВ SC	MUBP5206	Бизнес-процестерді модельдеу және басқару Моделирование и управление бизнес-процессами Business Process Modeling and Management	5,00	150,00	50,00	20,00	30,00			20,00	80,00		5,00				Второй триместр		
		БП БД BS	ТК КВ SC	POP5207	Жобаларды жоспарлау және бағалау Планирование и оценка проектов Project Planning and Assessment	5,00	150,00	50,00	20,00	30,00			20,00	80,00		5,00				Второй триместр		
		БП БД BS	ТК КВ SC	UKS209	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	UP5211	Жобаларды басқару Управление проектами Project management	5,00	150,00	50,00	20,00	30,00			20,00	80,00			5,00			Третий триместр		
Модуль бойынша барлығы/Итого по модулю/Total in module:						118,00	3 540,00	890,00	280,00	360,00	250,00		396,00	1 174,00	10,00	22,00	25,00	33,00	20,00	8,00	20	
3.Таңдау бойынша модульдер/3.Модули по выбору/3.Optional modules																						
1	Кәсіби деңгейдегі Надпрофессиональный Professionally only	ҚА ИА FE		IGA601	Қорытынды мемлекеттік аттестаттау Итоговая государственная аттестация Final state certification	12,00	360,00												12,00	Шестой триместр		
Модуль бойынша барлығы/Итого по модулю/Total in module:						12,00	360,00												12,00	1		
Кредиттер бойынша барлығы/Итого кредитов/Total credits:						148,00	4 440,00	1 070,00	350,00	470,00	250,00		468,00	1 462,00	25,00	25,00	25,00	33,00	20,00	20,00	25	
Зерттеу жұмыстары/Исследовательская работа/Research work:						24,00	720,00								2,00		7,00	7,00	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:															75,00	75,00	75,00	93,00	60,00	60,00		
БП кредиттерінің саны/Количество кредитов БД/Number of credits in BS:						50,00	1 440,00	480,00	190,00	290,00			192,00	768,00	25,00	15,00	10,00					
БП-нің ТК кредиттерінің саны/Количество кредитов БД КВ/Number of credits in BS SC:						30,00	900,00	300,00	120,00	180,00			120,00	480,00	10,00	10,00	10,00			6		
БП-нің ЖООК кредиттерінің саны/Количество кредитов БД БК/Number of credits in BS UC:						20,00	540,00	180,00	70,00	110,00			72,00	288,00	15,00	5,00				5		
КП кредиттерінің саны/Количество кредитов ПД/Number of credits in majors:						62,00	1 560,00	590,00	160,00	180,00	250,00		276,00	694,00		8,00	15,00	26,00	13,00			
КП-нің ТК кредиттерінің саны/Количество кредитов ПД КВ/Number of credits in majors SC:						26,00	780,00	340,00	80,00	100,00	160,00		172,00	268,00				26,00		4		
КП-нің ЖООК кредиттерінің саны/Количество кредитов ПД БК/Number of credits in majors UC:						36,00	780,00	250,00	80,00	80,00	90,00		104,00	426,00		8,00	15,00		13,00		5	

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 of the future master 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:	
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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 construction of automated mechatronic systems and devices. 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 implement design and research issues, taking into account technical requirements and economic justification. Ability to comprehensively systematize 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.
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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.