

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. Seifullin Kazakh  
agrotechnical University. "  
A. K. Kurishbayev  
" " " 2019



**EDUCATIONAL PROGRAM**

**7M07105, 7M07123, 7M07124 "Management of technical systems»**  
(program name)

Education area code and classification	7M07 Engineering, manufacturing and construction industries
Code and classification of training areas the International standard classification of education code	7M071 Engineering and engineering 0710
Degree awarded	Master of engineering / master of engineering and technology
Period of study	2; 1.5; 1 years
Form of training	intramural
Language of instruction	state / Russian

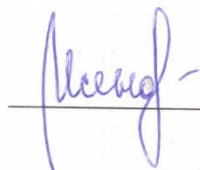
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The educational program "management of technical systems" was considered at the meeting of the Department of electrical equipment operation (Protocol No. 10 of 08.04.2019) and approved by the academic Council of the faculty of Energy (Protocol No.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

Dean of the faculty of energy



Isenov S. S.

Head of  
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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 of effective educational process for formation and development of personal, social and cultural, General engineering and professional competences in systems of management of production and technological processes and productions.

### **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**

Modern production and technical systems consist of a number of complex interacting subsystems-robotic technological and automated power plants, combined into a single technical system, as well as systems for their management, automation, Informatization, digitalization. The high level of manufacturability of modern technical systems from the point of view of a single process or the entire production requires management of various parameters: technology, safety, reliability, quality, etc.

Development of control systems for complex technical objects concerns not only new production facilities, but also the introduction of control elements in existing processes and production without compromising the quality, reliability and efficiency of operation. For the implementation of all stages from design to operation, it is important to train specialists who are capable of large-scale thinking, have a broad Outlook on the problems of technology and technology, have the skills to apply fundamental knowledge to solve practical problems.

## **2.2 Competitive advantages**

- \* Rich scientific and educational experience in the field of management of energy systems, technological processes and production.

- \* Experienced scientists and teachers train future specialists, preserving and developing rich traditions in the Department and faculty.

- \* All specialized disciplines are provided with modern laboratory facilities (Siemens, Schneider Electric, Danfoss, Festo, Edibon, Arduino, Educational equipment, etc.), there is a scientific training ground, a specialized laboratory.

- \* 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 the curriculum, programs of special disciplines.

## **2.4 the Potential of the profession (office)**

- \* Engineer for automated process control systems.

- \* Circuit engineer.

- \* Design engineer.

- \* Engineer-designer.

- \*The head of the group of APCS.

- \* Head of the information and computing center.

- \* Deputy head of the enterprise for information support.

### **3. Competence model (portrait) of the graduate**

#### **3.1 Areas of professional activity**

- \* Modeling, quality and reliability of technical systems.
- \* Business process modeling and management.
- \* Management of energy systems.
- \* Management of agricultural production.
- \* Management of technological processes.
- \* Pump, compressor and ventilation control systems.
- \* Control systems of lifting and transport mechanisms, production lines.
- \* Control systems for numerical control machines, industrial robots and manipulators.
- \* Algorithms and programming,
- \* Data transmission and storage systems.
- \* Microprocessors and microcontrollers.
- \* Control and measurement systems.

#### **3.2 professional activities**

Master of the educational program "Management of technical systems" can carry out the following types of professional activities:

- \* design - preparation of feasibility studies for projects; calculation and design of devices and control systems; development of design documentation; quality control and evaluation;
- \* production and technological-analysis of processes and control objects, improvement of quality, reliability and safety of technical systems through the use of intelligent control systems, selection of equipment and tooling, development and control of technology standards;
- \* organizational and management - organization of the team, management decisions; organization of staff training; adaptation of modern versions of quality management systems to specific production conditions on the basis of international standards, implementation of technical control and quality management;
- \* research-experimental and development work in process and production management systems;
- \* educational and pedagogical-teaching of disciplines in educational institutions of technical and professional education;
- \* service-operational-maintenance, current and overhaul of devices and devices of control systems.

#### **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 ability to communicate orally and in writing in the state or Russian and foreign languages to solve problems of interpersonal and intercultural interaction.
- \* To work in a team, tolerant of social, ethnic, religious and cultural differences.
- \* To ability to self-organization and self-education.

### **3.4 Core competencies**

- \* To know the rules of safety, industrial sanitation, fire safety and occupational safety standards.
- \* To know the test methods of technological, electrical equipment and control facilities.
- \* 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 solve problems of analysis and calculation of technical systems characteristics.
- \* To make calculations and design of separate blocks and devices of control systems and to choose standard means of automation, measuring and computer equipment according to the specification.
- \* To develop project documentation in accordance with existing standards and specifications.
- \* To set up control facilities and complexes and to carry out their routine maintenance with the use of appropriate tools.
- \* To check the technical condition of the equipment, to make its preventive control and repair.
- \* Perform installation and configuration of system, application and tool software of control 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**

Akmola electric grid distribution company, Astana - regional electric grid company, Kyzylorda electric grid distribution company, Astana electrotechnical plant, Mangystau branch of the main network, "Rodina" Agrofirma, Baiserke-agro, Kaznii of mechanization and electrification of agriculture, AST – Technologiya, Astana gorzharyk, New systems - teplolyux, IP-Stroyenergomagistral, EnergyserviceRTD, energyconsultinggroup, laimgroupastana, General plan of 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		1500	50
1)	complexes of basic disciplines (DB)	600	20
	High school component	150	5
	History and philosophy of science	150	5
	Management psychology	150	5
	Foreign language (professional)	90	3
	Pedagogy of higher education	60	2
2)	Pedagogical practice	900	30
	Optional component	150	5
	Economy and organization of production enterprises	150	5
	Economics and organization of energy enterprises	150	5
	Business process modeling and management	150	5
	Project planning and evaluation	150	5
	Quality management	150	5
2	Project management	1860	62
1)	Complexes of profile disciplines (PD)	1080	36
	University component and (or) optional Component	240	8
	Control system	240	8
	Fundamentals of mechatronics	300	10
	Research practice	300	10
2)	Project and scientific work	780	26
	Optional component	210	7
	Energy quality management	210	7
	Energy saving	180	6
	Modeling of technical systems	180	6
4	Problem solving in engineering	720	24
5	Research work of a graduate student, including internship and execution of a master's thesis	360	12
1)	End of course certification	360	12
	Preparation and defense of master's thesis	4440	148

## Master degree Profile (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
	Economy and organization of production enterprises	120	4
	Economics and organization of energy enterprises	120	4
	Quality management	150	5
	Project management	150	5
2	complexes of profile disciplines (PD)	1740	58
1)	University component and (or) optional Component	960	32
	Control system	240	8
	Fundamentals of mechatronics	240	8
	Project and scientific work	300	10
	Manufacturing practice	180	6
2)	Optional component	780	26
	Energy quality management	210	7
	Energy saving	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	Final 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
	Energy quality management	120	4
	Energy saving	120	4
2	complexes of profile disciplines (PD)	990	33
1)	University component and (or) optional Component	510	17
	Fundamentals of mechatronics	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	Final certification	360	12
1)	Registration and protection of the master's project	360	12
	Subtotal	2160	72



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
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	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	с	с	зд/сз	зд/сз	к	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	
2 курс 2020-2021 г.	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	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/зд	/э	/э	/э	/э	/э	/э	/э	/э	/э	/э	с	сз	к	к	на	на	на	на	на	на	на	на																															

\*ЭИРМ в период теоретического обучения

Презентация	Теоретич. обуч.	Экзамен. сессия	Каникулы	Исслед. практика	Произв. практика	Летний сем.	Запись на дисц.	Сдача FX	Итоговая аттестация	ЭИРМ
п	б	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 is/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 Цикл дисциплин Cycle of disciplines	Компонент Компонент Component	Пәнаралық код Код дисциплины Code of discipline	Пәндер атауы Наименование дисциплины Discipline name	ҚР ұжымт. 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)										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 ақпараттық сағат саны Всего аудиторных часов Total class hours	Дарсханалық сабақтар Аудиторные занятия Class work					БАӨБЖ СРОП ІНСТ СРО	БАӨЖ СРО ІНСТ СРО	СРО ІНСТ СРО	1 курс (год)			Енгізілеу Екімен Екімен Входные Экзамен Экзамен	Курстық және жұмыс Курсовая работа Лаборатория
									Лекция Lectures	Практикалық сабақтар Практические (семинары) Practical classes/seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Студенттік сабақтар Студентские занятия Studio work	Триместрлердегі апталар саны Неделя в триместре Weeks per trimester								
													1				2	3			
10	10	10																			
<b>1.Жалпы модульдер/1.Общие модули/1.Common modules</b>																					
1	Гуманитарлық-әлеуметтік Гуманитарно-социальный Humanitarian-social	БП БД BS	ЖК БК UC	ПУ5201	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	ҮҮаР5203	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			
<b>Модуль бойынша барлығы/Итого по модулю/Total in module:</b>						<b>4,00</b>	<b>120,00</b>	<b>40,00</b>	<b>20,00</b>	<b>20,00</b>			<b>16,00</b>	<b>64,00</b>	<b>2,00</b>	<b>2,00</b>		<b>2</b>			
<b>2.Мамандық модульдері/2.Модули специальности/2.Specialty modules</b>																					
1	Кәсіптік бағытталған Профессионально-ориентированный professionally-oriented	3Ж ІР RW		ЕІРМ\VM D501	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 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	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	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	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 БК UC	M5205	Менеджмент Менеджмент Management	2,00	60,00	20,00	10,00	10,00			8,00	32,00	2,00			Первый триместр			
<b>Модуль бойынша барлығы/Итого по модулю/Total in module:</b>						<b>56,00</b>	<b>1 680,00</b>	<b>390,00</b>	<b>110,00</b>	<b>130,00</b>	<b>150,00</b>		<b>156,00</b>	<b>624,00</b>	<b>22,00</b>	<b>26,00</b>	<b>8,00</b>	<b>11</b>			
<b>3.Таңдау бойынша модульдер/3.Модули по выбору/3.Optional modules</b>																					
1	Кәсіпбилі аспазы Надпрофессиональный Professionally only	КА ІА FE		IGA501	Қорытынғы мемлекеттік аттестаттау Итоговая государственная аттестация Final state certification	12,00	360,00										12,00	Третий триместр			

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	
КА кредиттерінің саны/Количество кредитов КА/Number of credits in FE:	12,00	360,00										12,00	1	
Орташа апталық жұмыс уақыты 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	





		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 БК UC	OM5305	Мехатроника негидролі 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	Технические системы модели 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 КВ SC	R1Z5308	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	
<b>Модуль бойынша барлығы/Итого по модулю: Total in module:</b>						<b>96,00</b>	<b>2 880,00</b>	<b>710,00</b>	<b>250,00</b>	<b>290,00</b>	<b>170,00</b>		<b>288,00</b>	<b>1 162,00</b>	<b>29,00</b>	<b>24,00</b>	<b>25,00</b>	<b>18,00</b>		<b>17</b>	
<b>3. Таблица бойынша модульдер/3. Модули по выбору/3. Optional modules</b>																					
1	Кәсібиден алдын Надпрофессиональней Professionally onlu	ҚА ИА FE		IGA601	Қорытынғы мемлекеттік аттестаттау Итоговая государственная аттестация Final state certification	12,00	360,00												12,00	Пятый триместр	
<b>Модуль бойынша барлығы/Итого по модулю: Total in module:</b>						<b>12,00</b>	<b>360,00</b>												<b>12,00</b>	<b>1</b>	
<b>Кредиттер бойынша барлығы/Итого кредитов: Total credits:</b>						<b>112,00</b>	<b>3 360,00</b>	<b>750,00</b>	<b>270,00</b>	<b>310,00</b>	<b>170,00</b>		<b>304,00</b>	<b>1 226,00</b>	<b>31,00</b>	<b>26,00</b>	<b>25,00</b>	<b>18,00</b>	<b>12,00</b>	<b>20</b>	
<b>Зерттеу жұмыстары/Исследовательская работа/Research work:</b>						<b>18,00</b>	<b>540,00</b>							<b>5,00</b>	<b>4,00</b>	<b>1,00</b>	<b>8,00</b>		<b>4</b>		
<b>ҚА кредиттерінің саны/Количество кредитов ИА/Number of credits in FE:</b>						<b>12,00</b>	<b>360,00</b>											<b>12,00</b>	<b>1</b>		
<b>Орташа апталық жүктеменің сағат саны/Средняя недельная нагрузка в часах/Weekly average workload at hours:</b>														<b>93,00</b>	<b>78,00</b>	<b>75,00</b>	<b>54,00</b>	<b>36,00</b>			
<b>БП кредиттерінің саны/Количество кредитов БД/Number of credits in BS:</b>						<b>24,00</b>	<b>720,00</b>	<b>240,00</b>	<b>110,00</b>	<b>130,00</b>			<b>96,00</b>	<b>384,00</b>	<b>12,00</b>	<b>2,00</b>	<b>10,00</b>				
<b>БП-інің ТК кредиттерінің саны/Количество кредитов БД КВ/Number of credits in BS SC:</b>						<b>18,00</b>	<b>540,00</b>	<b>180,00</b>	<b>80,00</b>	<b>100,00</b>			<b>72,00</b>	<b>288,00</b>	<b>8,00</b>		<b>10,00</b>			<b>4</b>	
<b>БП-інің ЖООК кредиттерінің саны/Количество кредитов БД БК/Number of credits in BS UC:</b>						<b>6,00</b>	<b>180,00</b>	<b>60,00</b>	<b>30,00</b>	<b>30,00</b>			<b>24,00</b>	<b>96,00</b>	<b>4,00</b>	<b>2,00</b>				<b>3</b>	
<b>КП кредиттерінің саны/Количество кредитов ПД/Number of credits in majors:</b>						<b>58,00</b>	<b>1 560,00</b>	<b>510,00</b>	<b>160,00</b>	<b>180,00</b>	<b>170,00</b>		<b>208,00</b>	<b>842,00</b>	<b>14,00</b>	<b>20,00</b>	<b>14,00</b>	<b>10,00</b>			
<b>КП-інің ТК кредиттерінің саны/Количество кредитов ПД КВ/Number of credits in majors SC:</b>						<b>26,00</b>	<b>780,00</b>	<b>260,00</b>	<b>80,00</b>	<b>100,00</b>	<b>80,00</b>		<b>104,00</b>	<b>416,00</b>	<b>14,00</b>	<b>12,00</b>					<b>4</b>
<b>КП-інің ЖООК кредиттерінің саны/Количество кредитов ПД БК/Number of credits in majors UC:</b>						<b>32,00</b>	<b>780,00</b>	<b>250,00</b>	<b>80,00</b>	<b>80,00</b>	<b>90,00</b>		<b>104,00</b>	<b>426,00</b>		<b>8,00</b>	<b>14,00</b>	<b>10,00</b>			<b>4</b>

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	Пәнаралық цикл Цикл дисциплин Cycle of disciplines	Компонент Компонент Component	Пәнаралық код Код дисциплины Code of discipline	Пәнаралық атауы Наименование дисциплины Discipline name	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 course and semesters (trimesters, quarters)			Кредиттері курс және семестр (триместр, квартал) бойынша бөлу Распределение кредитов по курсам и семестрам (триместрам, кварталам) Distribution of credits by course and semesters (trimesters, quarters)			Бақылау түрі Формы контроля Forms of control			
						КР кредит саны Число кредитов КР Number of KZ credits	Барлығы сағат Всего в часах Total (in hours)	Дәрісханалық сабақтар Аудиторные занятия Class work					БАӨБЖ СРО ОП ИВСТ БАӨЖ СРО ИВС	1 курс (year)	2 курс (year)	1	2	3	1	2	3	Елшілік Экзам	Курстық жарнама Курсовая работа Темат. раб.		
								Дәріс Лекции Lectures	Практикалық семинарлық сабақтар Практические семинары Practical classes/seminars	Зертханалық сабақтар Лабораторные занятия Laboratory work	Студиялық сабақтар Студийные занятия Studio work	1												2	3
<b>1.Жалпы модульдер/1.Общие модули/1.Common modules</b>																									
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					
					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				
					Шет тіл (касіби) Иностранный язык (профессиональный) Foreign language (professional)	5,00	150,00	50,00	20,00	30,00		20,00	80,00	5,00								Первый триместр			
					Жоғарғы 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		
<b>Модуль бойынша барлығы/Итого по модулю/Total in module:</b>						<b>18,00</b>	<b>540,00</b>	<b>180,00</b>	<b>70,00</b>	<b>110,00</b>		<b>72,00</b>	<b>288,00</b>	<b>15,00</b>	<b>3,00</b>				<b>4</b>						
<b>2.Мамандық модульдері /2.Модули специальности/2.Specialty modules</b>																									
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				
					Басқару жүйелері Системы управления Control system	8,00	240,00	80,00	20,00	20,00	40,00		32,00	128,00	8,00							Второй триместр			
					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			
					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		
					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		
					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							Пятый триместр	
					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 бағыттағандық Профессионально-ориентированный professionally-oriented	ЗЖ ИР RW	---	NIRMVVM D601	Магистранттың ғылыми-зерттеу жұмысы, магистрлік диссертацияны орындаумен қоса 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					
					Зерттеу тәжірибесі Исследовательская практика	10,00	300,00										7,00		3,00			Третий триместр, Пятый			

		PS	UC		Research practice														----- триместр		
		БП БД BS	ЖК ВК UC	PP5210	Педагогикалық тәжірибе Педагогикалық практика Teaching practice	2,00	60,00												Второй триместр		
3	Экономикалық-бақарушылық Экономика-управленческий Economic and managerial	БП БД BS	ТК КВ SC	EOPP5202	Әлеуметтік өнеркәсіптің 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-процестерінің модельдеу және бақылау 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	Жобалардың 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	Жобалардың бақылау Управление проектами Project management	5,00	150,00	50,00	20,00	30,00			20,00	80,00			5,00		Третий триместр		
<b>Модуль бойынша барлығы/Итого по модулю/Total in module:</b>						<b>118,00</b>	<b>3 540,00</b>	<b>890,00</b>	<b>280,00</b>	<b>360,00</b>	<b>250,00</b>		<b>396,00</b>	<b>1 174,00</b>	<b>10,00</b>	<b>22,00</b>	<b>25,00</b>	<b>33,00</b>	<b>20,00</b>	<b>8,00</b>	<b>20</b>

3. Таблица 6 бойынша модульдер/3. Модули по выбору/3. Optional modules

1	Кәсіби деңгейдегі Надпрофессиональный Professionally only	КА ИА FE		IGA601	Қорытынды мемлекеттік аттестаттау Итоговая государственная аттестация Final state certification	12,00	360,00												12,00	Шестой триместр	
<b>Модуль бойынша барлығы/Итого по модулю/Total in module:</b>						<b>12,00</b>	<b>360,00</b>												<b>12,00</b>	<b>1</b>	
<b>Кредиттер бойынша барлығы/Итого кредитов/Total credits:</b>						<b>148,00</b>	<b>4 440,00</b>	<b>1 070,00</b>	<b>350,00</b>	<b>470,00</b>	<b>250,00</b>		<b>468,00</b>	<b>1 462,00</b>	<b>25,00</b>	<b>25,00</b>	<b>25,00</b>	<b>33,00</b>	<b>20,00</b>	<b>20,00</b>	<b>25</b>
<b>Зерттеу жұмыстары/Исследовательская работа/Research work:</b>						<b>24,00</b>	<b>720,00</b>								<b>2,00</b>		<b>7,00</b>	<b>7,00</b>	<b>8,00</b>	<b>4</b>	
<b>ҚА кредиттерінің саны/Количество кредитов ИА/Number of credits in FE:</b>						<b>12,00</b>	<b>360,00</b>												<b>12,00</b>	<b>1</b>	
<b>Орташа апталық жүктеменің сағат саны/Средняя недельная нагрузка в часах/Weekly average workload at hours:</b>																					
<b>БП кредиттерінің саны/Количество кредитов БД/Number of credits in BS:</b>						<b>50,00</b>	<b>1 440,00</b>	<b>480,00</b>	<b>190,00</b>	<b>290,00</b>			<b>192,00</b>	<b>768,00</b>	<b>25,00</b>	<b>15,00</b>	<b>10,00</b>				
<b>БП-нің ТК кредиттерінің саны/Количество кредитов БД КВ/Number of credits in BS SC:</b>						<b>30,00</b>	<b>900,00</b>	<b>300,00</b>	<b>120,00</b>	<b>180,00</b>			<b>120,00</b>	<b>480,00</b>	<b>10,00</b>	<b>10,00</b>					<b>6</b>
<b>БП-нің ЖООК кредиттерінің саны/Количество кредитов БД ВК/Number of credits in BS UC:</b>						<b>20,00</b>	<b>540,00</b>	<b>180,00</b>	<b>70,00</b>	<b>110,00</b>			<b>72,00</b>	<b>288,00</b>	<b>15,00</b>	<b>5,00</b>					<b>5</b>
<b>КП кредиттерінің саны/Количество кредитов ПД/Number of credits in majors:</b>						<b>62,00</b>	<b>1 560,00</b>	<b>590,00</b>	<b>160,00</b>	<b>180,00</b>	<b>250,00</b>		<b>276,00</b>	<b>694,00</b>		<b>8,00</b>	<b>15,00</b>	<b>26,00</b>	<b>13,00</b>		
<b>КП-нің ТК кредиттерінің саны/Количество кредитов ПД КВ/Number of credits in majors SC:</b>						<b>26,00</b>	<b>780,00</b>	<b>340,00</b>	<b>80,00</b>	<b>100,00</b>	<b>160,00</b>		<b>172,00</b>	<b>268,00</b>				<b>26,00</b>			<b>4</b>
<b>КП-нің ЖООК кредиттерінің саны/Количество кредитов ПД ВК/Number of credits in majors UC:</b>						<b>36,00</b>	<b>780,00</b>	<b>250,00</b>	<b>80,00</b>	<b>80,00</b>	<b>90,00</b>		<b>104,00</b>	<b>426,00</b>		<b>8,00</b>	<b>15,00</b>		<b>13,00</b>		<b>5</b>



### Annex 3. Description of University obligatory component disciplines

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
Name of discipline	Foreign language (professional)
2. Prerequisites:	-
3. Post-requisites:	-
4. The content of the discipline	The mastery 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

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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 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

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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

<b>1. Basic information about the discipline:</b>	
Name of discipline	Economy and organization of production enterprises
2. Prerequisites:	-
3. Post-requisites:	
4. The content of the discipline	Business process modeling and management, project Planning and evaluation 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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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

<b>1. Basic information about the discipline:</b>	
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

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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.

<b>1. Basic information about the discipline:</b>	
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 to 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.