Ministry of Agriculture of the Republic of Kazakhstan S.Seifullin Kazakh Agrotechnical University

Considered at the meeting of the Academic Council of the University Protocol no._____ " 2022 G. APPROVED

Chairman of the Management Board non-profit joint stock company " S.Seifullin Kazakh Agrotechnical University "

«____»____2022 г.

EDUCATIONAL PROGRAM "ADVANCED AGRONOMIC SCIENCE"

Code and classification of the field of education: 6B08 Agriculture and bioresources

Code and classification of training areas: 6B081 Crop production

Code in the International Standard Classification of Education: 0812

Degree awarded: Bachelor of Agriculture in the educational program "Advanced Agronomic Science"

Duration of study: 4 years

The author's team:

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		Kazakh Agrotechnical University

The team of authors was approved by the order of the Non-profit Joint Stock Company " S.Seifullin Kazakh Agrotechnical University " No. 337-N dated 06/24/2022.

The educational program 6B08105 - "Advanced agronomic science" was considered at the meeting of the Department "Agriculture and Plant Growing" Protocol No. 1 of August 26, 2022, approved by the Council of the Faculty of Agronomy Protocol No. 1 of August 27, 2022.

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Content

1 Passport of the educational program

1.1 .Goal of the educational program

The goal of the educational program is to prepare bachelors in the direction of "Agronomy" with in-depth study of fundamental disciplines (biology, chemistry, mathematics, physics, IT), for the development of professional competencies of the scientific direction, as well as for continuing studies in master's degree programs of world universities.

1.2 Objectives of the educational program:

- implementation of fundamental education aimed at training highly qualified personnel in the professional field;

- introduction of innovative technologies in the education and training of competitive specialists in the field of Agronomy;

- the use of modern educational technologies, techniques, approaches and innovative methods in teaching disciplines;

-training of competent specialists with in-depth theoretical knowledge and practical skills for admission to the magistracy of world-class universities;

- formation of universal and socio-personal values of the graduate, as well as environmental, physical, ethical, legal culture, culture of thinking;

-education in the spirit of patriotism, friendship of the peoples of the Republic of Kazakhstan, respect for different cultures, traditions and customs;

-prepare the graduate for professional activity, mobility, continuous professional and moral improvement and growth throughout life;

-formation of graduates' competitiveness in the labor market to ensure the possibility of the fastest possible employment in the specialty.

1.3. Learning results

PO1 – Apply a foreign language in professional-oriented speech communication situations, study information from foreign sources in the original language. To write, describe, compare, discuss, explain thoughts, facts and opinions orally and in writing in the field of agronomy.

PO2 – Apply economic and legal knowledge in the field of agriculture; Navigate in the branches of Kazakh law for state regulation of the economy and agricultural business. Analyze the economic state of industries, predict the prospects for the development of economic entities in the conditions of the domestic and world market, identify key elements and assess its impact on the organization, organizational structure. To determine the economic efficiency of the use of technological methods of production and processing of agricultural products. Evaluate and integrate the basic theories of motivation, leadership and power to solve strategic and operational management tasks, understand the importance of the principles and culture of academic integrity and anti-corruption culture;

PO3 – Formulate an idea of the problems of sustainable development associated with anthropogenic and technogenic impacts. To evaluate the role of the

"human" factor in the work of increased danger, to analyze information about the state of the environment and working conditions in the workplace, to analyze phenomena and events of a natural, man-made and social nature, to choose solutions to the problem of ensuring optimal working conditions, industrial safety and life in emergencies, to integrate the results of scientific research in the field of occupational safety and security life activities;

PO4 – Apply methods, technologies, methods of obtaining, storing and processing information. Classify basic information processing algorithms, develop programs and use application software packages in agronomy, apply modern information technologies in the production of crop products. To present and analyze basic information for solving specific tasks in crop production;

PO5 – To approve the basic properties of the most important chemical and bioactive substances, to explain the equations of reactions, physico-chemical methods of analysis. Apply the properties of chemicals in the production of crop products, evaluate the equivalents of substances for the preparation of solutions of various concentrations. Plan and carry out an experiment on the use of chemicals in agronomy using methodological guidelines and literary sources;

PO6 – Apply the basic laws and principles of physics, research methods for analyzing the results of the experiment and modeling the situation. Understand electrical, magnetic and optical phenomena in the production of crop products. To demonstrate the ability to work with measuring instruments and with application software packages, to solve applied problems with further generalization of the results obtained in crop production;

PO7 – Solve mathematical problems and models, find the most acceptable solution methods for mathematical thinking and logic. Calculate and apply mathematical, statistical, informational and graphical methods of data analysis to study various processes in the production of crop products and management of agricultural technologies with further generalization of the results obtained;

PO8 – Describe and distinguish the structure and diversity of plant forms, plant life processes, identify wild plants and agricultural crops of the region and their optimal placement taking into account land and soil-climatic resources. Classify the organization of hereditary material at the gene, chromosomal and genomic levels, interpret the molecular genetic and cellular levels of the organization of plant life;

PO9 – Analyze agrometeorological information in crop production technology. Describe the main types and varieties of soils, assess the levels of its fertility, set doses and methods of applying organic and mineral fertilizers for the planned crop yield. To assess the phytosanitary condition of crops, to analyze the technologies of phytosanitary optimization of agroecosystems by phases of vegetation. Apply a system of agrotechnical measures to increase soil fertility, build crop rotations, tillage systems for crops taking into account soil and climatic conditions, develop modern technologies for cultivating field crops;

PO10 – Interpret the main breeding and seed-growing processes, phenomena and patterns, demonstrate knowledge about seeds. Use modern laboratory equipment to perform qualitative and quantitative analysis of the characteristics

and properties of various crops. Generalize and combine knowledge about the creation of models, varieties and hybrids. Evaluate breeding materials with a set of useful traits based on knowledge of phenotypic, biochemical and molecular genetic techniques. Plan and organize the propagation of seeds of varieties of agricultural crops. Conduct field experiments and use scientific research methods.

1 General characteristics of the educational program

The educational program 6B08105 "Advanced Agronomic Science" was developed to implement a cooperation agreement with AgroParisTech University aimed at improving the quality of educational services in the field of agriculture. The new educational program will allow you to gain in-depth knowledge in the academic environment with the possibility of applying them while continuing the postgraduate education program at domestic and world universities.

A feature of the implemented program is to provide training of specialists with in-depth fundamental knowledge, which is the basis of professional competencies in accordance with the requirements of employers in the field of agriculture and related industries in the direction of Agronomy.

A distinctive feature of the educational program: joint educational program with Agro Paris Tech - Paris Institute of Technology of Life Sciences, Food and Environment (France).

The uniqueness of the new educational program is the strengthening of basic knowledge using an interdisciplinary approach for the development of professional disciplines in the field of training.

The educational program "6B08105 Advanced Agronomic Science" was developed in accordance with the classifier of training areas with higher and postgraduate education (Approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 569 dated October 13, 2018) and agreed with the Dublin descriptors and the European Qualifications Framework.

The educational program is focused on the training of specialists and scientific and pedagogical personnel, and the transfer of scientific results to the relevant sector of the economy on the basis of scientific achievements, both the results of their own research and world science.

The educational program is developed on the basis of a modular system for studying disciplines and consists of 12 modules. The total volume of theoretical undergraduate education is 242 credits, including the cycle of general education disciplines includes 56 credits, the cycle of basic disciplines - 121 credits, the cycle of profile disciplines - 53 credits and the final certification is 12 academic credits.

3 Competence model (portrait) of the graduate

3.1 Areas of professional activity

Graduates who have mastered the educational program "Advanced agronomic science" can work in research institutions in the field of agriculture; secondary specialized educational institutions, regardless of the forms of ownership in the field of training, institutions for variety testing of agricultural crops; institutions of agrochemical service, quarantine services; plant protection stations.

3.2 Types of professional activity

Bachelors of the educational program "Advanced Agronomic Science" can perform the following types of professional activities:

- experimental research;

- organizational and managerial;

- production and technological;

- - educational pedagogical activity in secondary vocational educational institutions in the field of crop production.

3.3 General education competencies

To know the prerequisites for the formation of the statehood of modern Kazakhstan; general principles of being and cognition, human and world relations, patterns of formation of the personality of a specialist with higher professional education, patterns of the emergence of political phenomena (institutions, relations, processes), ways and forms of their functioning, methods of managing political processes, consciousness, the structure of society, norms and values, ways and the peculiarities of the functioning of the elements of society, the peculiarities of the processes of individuals and their role in the development of society; language and speech means, vocabulary, forms and types of speech/communication of the state, Russian and foreign languages; types of information and communication technologies; automation of information; purpose and types of information models, purpose and functions of operating systems

Must show the ability to argue their own assessment of everything that is happening in the social and industrial spheres on the basis of ideological positions; make a choice of methodology and analysis in the field of such activities; assess situations in various areas of interpersonal, social and professional communication; operate with social, business, cultural, legal and ethical norms of Kazakh society; use various types of personal activities information and communication technologies; to build a personal educational trajectory throughout life for selfdevelopment and career growth.

Possess the skills of: practical application of knowledge in the field of social, social and humanitarian sciences; communication in oral and written forms in Kazakh, Russian and foreign languages, solving problems of interpersonal, intercultural and professional communication.

3.4 Basic competencies

To know and understand: To possess communication skills in a foreign language, to understand, express, interpret concepts, thoughts, feelings, facts and

opinions orally and in writing in the appropriate range of social and cultural contexts, terminology in agronomy, obtaining professional content information from foreign sources, to master the stylistic features of the vocabulary of a foreign language in the field of professional communication and be competent: in the use of a foreign language in professional-oriented speech communication situations, in a professional foreign language environment with awareness of the need to use appropriate speech patterns and tactics of speech professional behavior. Possess knowledge of economic and legal knowledge in the field of agriculture, the specifics of the functioning of agricultural production, the forms and consequences of state regulation in the agri-food sector, and the peculiarities of agribusiness, navigate the branches of Kazakh law, the goals and methods of state regulation of the economy. Analyze the state of industries, predict the prospects for the development of economic entities in the conditions of the domestic and world market, the external and internal environment of the organization, identify its key elements and assess its impact on the organization, organizational structure and be able to develop proposals for its improvement. Demonstrate knowledge on determining the economic efficiency of the use of technological techniques for the production and processing of agricultural products. Master the skills of using the basic theories of motivation, leadership and power to solve strategic and operational management tasks.

To show skills: to form professional ideas with critical reasoning; to coordinate professional activities at the assigned site with the activities of other sites; to assess the prospects for the development of the economy in market conditions.

Possess skills: Use basic methods, methods and means of obtaining, storing, processing information, information and communication technologies. Apply basic information processing algorithms to solving applied problems, develop programs in a programming language using basic control structures and standard data types, use application software packages. Be able to use theoretical knowledge in practice, use a system of knowledge about information technologies to solve specific problems in crop production, present and analyze basic information with the help of basic programs used in agricultural institutions.

3.5 Professional competencies

know and understand: To form knowledge that allows solving a set of professional tasks taking into account the socio-ethnic norms accepted in society, to form knowledge of general physics, the basics of thermodynamics and electromagnetism, biophysics, to formulate basic concepts of basic knowledge, to solve physical problems in professional activity, to perform a physical experiment, to identify, compare, draw conclusions, formulate their own arguments in applied tasks of the future profession, work with modern information technologies, have the skills to calculate and process the received data, to use philosophical knowledge to form ideological positions, to strive for knowledge, pragmatism, competitiveness, which is the fundamental principle of the development of society in the conditions of modern reality. Memorize and reproduce the information

received, the main breeding terms, specific facts, list patterns in plant breeding and genetics. The ability to present the material in your own words. To know and understand the rules and principles in plant breeding and genetics, can explain facts, patterns and phenomena and interpret graphs and diagrams. Be able to solve practical problems using new methods, formulas and laws. Highlight the principles of data construction and can highlight the most effective research methods. The ability to generalize and combine their knowledge. Creation of new models, varieties and hybrids, identify problems and suggestions for their solution. Evaluate claims using criteria, requirements, or research methods. Logical accuracy of conclusions and argumentation of one's point of view. To know the concept of the variety model, the sources of hereditary variability, their role for breeding.

be able to: be able to apply the basic rules and laws of physics in solving physical problems and situations, work with measuring instruments and with application software packages, develop the ability to self-organize and self-education. Use modern laboratory equipment to perform qualitative and quantitative analysis of the characteristics and properties of various crops. To create various backgrounds for the selection of breeding material with a set of useful features, to carry out an assessment based on knowledge of phenotypic, biochemical and molecular genetic methods of marker analysis. The ability to generalize and combine their knowledge in plant breeding and genetics.

have skills: in solving organizational and economic issues; distribute labor resources, give clear and effective instructions. To operate with basic information methods of processing experimental studies to increase the level of reliability of experimental results.

4 The base of passing professional practices

The educational program provides educational practice in the discipline "General biology of organisms" - 2 credits, production (in the disciplines of agriculture, crop production) - 8 credits and pre-graduate practice - 2 credits, which is a university component.

The passage of professional practice of students is planned mainly during the spring sowing campaign and harvesting of crops, on the campus of the S.Seifullin Kazakh Agrotechnical University, in the fields of large agricultural enterprises and farms and in experimental fields of research institutes of various regions of the republic.

Stationary fields of A.I.Barayev Scientific and Production Center of Grain Farming LLP, State Administration "Virgin Regional Inspection for variety Testing of agricultural enterprises" are used as bases of production practice. Kazakh Research Institute of Agriculture and Plant Growing, LLP "East Kazakhstan Research Institute of Agriculture", LLP "North Kazakhstan Research Institute of Agriculture", LLP "Kostanay Research Institute of Agriculture", LLP "Karabalyk agricultural experimental Station", LLP "Karaganda experimental station", LLP "Experimental farm of oilseeds", Agrobiological Center of the Kazakh Agrotechnical University named after S.Seifullin, large firms, large agricultural enterprises and farms, including TNK Agrofirma LLP, Bayserke Agro LLP, Farmer 2002 LLP, Maksimovskoye LLP, Rodina LLP, Atameken Agro LLP, etc..

Methods of conducting professional practices: stationary, field, field-field.

For persons with disabilities, the choice of internship places is consistent with the requirement of their accessibility for these students and the state of health.5

	Name of cycles and disciplines	Total	labor
		intensity in	intensity in
N⁰		academic hours	academic hours
		in academic	in academic
		credits	credits
1	The cycle of general education disciplines		
	(00D)	1680	56
	is a mandatory component	1530	51
	Kazakh (Russian) language	300	10
	Foreign language	300	10
	Political Science and Sociology	120	4
1.1.	Cultural studies and psychology	120	4
	Modern history of Kazakhstan	150	5
	Philosophy	150	5
	Physical Culture.	240	8
	Information and communication technologies	150	5
	University component	150	5
1.2.	Occupational safety and the basics of life	150	E
	safety	150	5
	Component of choice		
12	Fundamentals of anti-corruption culture	150	5
1.5.	Introduction to Leadership in Education	150	5
	Fundamentals of Economics and Law	150	5
2	Cycle of basic disciplines (BD)	5220	174
	University component	1860	62
	Data mining	240	8
	Information technologies in crop production	90	3
	Professionally-oriented foreign language	120	4
	Inorganic and organic chemistry	120	4
	Educational practice in the discipline	60	2
	"General biology of organisms"	00	2
2.1.	Fundamentals of physics	120	4
	Ecology and sustainable development	120	4
	Agrometeorology	150	5
	Analytical and physic colloidal chemistry	150	5
	Genetics, ontogenesis, phylogeny	150	5
	Molecular and cellular biology	240	8
	Advanced Mathematics*	300	10

Structure of the educational program

	Component of choice	3360	112
	French	300	10
	English for special purposes	180	6
	Python language and data analysis	90	3
	Numerical methods	90	3
	Management in crop production	90	3
	Marketing in the agro-industrial complex	90	3
	Introduction to the specialty	60	2
	Fundamentals of land management	90	3
	Economics and organization of agricultural	150	E
	production	150	5
	Fundamentals of agribusiness and	150	5
2.2.	entrepreneurship	150	5
	Physiology and biochemistry of plants	150	5
	Fundamentals of Thermodynamics and	150	5
	Electromagnetism		
	Programming of crop yields	150	5
	Plant compositions and floristics	150	5
	Applied Chemistry	150	5
	Accounting in agriculture	180	6
	General biology of organisms	210	7
	Biology of plant ontogenesis	210	7
	Culture of plant cells and tissues	210	7
	Biophysics	210	7
	Plant genetics	300	10
3	Cycle of profile disciplines (PD)	2880	96
	University component	990	33
	Agriculture	90	3
	Crop production	90	3
	Seed science	90	3
3.1.	Cellular technologies in crop production and	90	3
	breeding	170	_
	Soil science and agrochemistry	150	5
	Production practice	240	8
	Selection of agricultural crops	240	8
	Component of choice	1890	63
	Entomology and phytopathology	90	3
	Fundamentals of scientific research	90	3
	Herbology	90	3
	Seed production and varietal technology of	90	3
2.2	Agricultural crops	00	2
3.2.	Dusiness statistics	90	ວ ວ
	Protection of agricultural crops	90	3
	Statictical processing of experimental data	120	4
	Fundamentals of processing farming	120	4
	Mothods of mathematical modeling	120	4 E
	Adaptive technologies in even availation	150	5
	Auaptive technologies in crop production	180	6

	Advanced Physics course	180	6
	Private breeding	240	8
	Advanced Chemistry course	240	8
4	Additional types of training (DVO)		
4.1.	Elective component (military training and other types of educational activities determined by the student independently)		
5	Final certification	360	12
5.1.	Writing and defending a thesis (project) or preparing and passing a comprehensive exam	360	12
	Total	7200	240

Appendix 1. Schedule of the educational process ***

Schedule of the educational process for the 2022-2023 academic year for the educational program "Advanced agronomic science" in the field of training 6B081 Agronomy

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• - теоретическое обуче	ние	Пп - профессиональная практика	BC	- военные сборы	КС	- контактная сессия
3Д - запись на дисципли	ны	Пр - производственная практика	Л	- летний семестр		
С - сессия экзаменацион	кан	Тп - технологическая практика	ИА	- государственные экзамены, написание и	защита дипломной работы	
3С - сдача FX		П - преддипломная/производственная практика				
Праздничные дни:	30, 31 августа - День Конституции	1, 2,3,4 января - Новый год	1,	, 2 мая - Праздник единства народа Казахстан	Ia	
	1 сентября - День знаний	7 января - Рождество Христово	7	мая - День защитника Отечества		
	1 декабря - День Первого Президента	8 марта - Международный женский день	9	мая - День Победы		
	16, 17 декабря - День независимости	21, 22, 23 марта - Наурыз мейрамы	6	июля - День столицы		

*** Reviewed and approved at the beginning of the academic year

Appendix 2. Working curriculum

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2						Ministry of Agriculture of the Republic of Kazakhstar	n																				
3					Non-pr	ofit joint stock company "S.Seifullin Kazakh Agrotechnica	l Unive	rsity "																			
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13					spe	Charty/group of educational programs Bo / / - Plant grown	1g																			+	
14						Degree: Bachelor Rom of study: Pott size (Deckelor Assess) toimester														_					_	+	
15						Form of study: Full-time (Bachelor 4 years) trimester												-		_	—		\rightarrow		_	+	
16				_		Year of admission: 25-05-2020		_													—			—		+	—
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25	2		GED	R	IYa 1110	Foreign language	2	1	1		2/60			40		10	10	2.0									
26	3		GED	R	IYa 1102	Foreign language	2	2	2		2/60			40		10	10		2.0				\square	\perp		\downarrow	
27	4		GED	R	KRYa 1108	Kazakh (Russian) language	2	2	2		2/60			40		10	10		2.0		\perp		$ \rightarrow $	$ \rightarrow $	\perp	+	_
28	5		GED	R	KRYa 1109	Kazakh (Russian) language	1	3	3	<u> </u>	1/30			20		5	5	-		1.0	+	+	\rightarrow	\rightarrow	\rightarrow	++	\rightarrow
29	6		GED	R	IYa 1111	Foreign language	1	3	3		1/30			20		5	5	-		1.0	_	+	\rightarrow	\rightarrow	\rightarrow	++	\rightarrow
30	7		GED	R	KRYa 2123	Kazakh (Russian) language	2	4		4	2/60			40		10	10	+		- 2.	<u>0</u>	+	\rightarrow	\rightarrow	\rightarrow	++	\rightarrow
31	8		GED	R	TYa 2126	Foreign language	2	4		4	2/60			40		10	10	+	$\left \right $	- 2.	0		\rightarrow	\rightarrow	+	++	+
32	9		GED	R	KRYa 2124	Kazakn (Russian) language	2	2		2	2/00			40		10	10	+	+	\rightarrow	2.0	4	\rightarrow	+	+	++	+
33	10		GED	R	1Ya 2127	Foreign language		2		0	2/00			40		10	10	+	\vdash	+	2.0	4.0	\rightarrow	+	+	++	+
34	12	Language disciplines	GED	-	IV= 2120	Kazakn (Russian) language				<u> </u>	1/30			20		0	0	+	+	+	+	1.0	\rightarrow	+	+	++	+
36	12	congooge orsorptilles	BD		POIVa 3201	Professionally-oriented foreign Ianguage		7		7	1/30			20		5	5	+	\vdash	+	+	1.0	10	+	+	++	+
37	14		BD	1č l	EVa 3212	Franch	2	7	+	7	2/80		⊢ •	40		10	10	+	+	+	+	+	50	+	+	++	+
38	15		BD	Ĭč	EYa 3257	French	2	8		8	2/60			40		10	10	+	\vdash		+			2.0	+	++	+
39	16		BD	Ű	POIYa 3237	Professionally-oriented foreign language	2	8		8	2/60			40		10	10				+			2.0	+	++	

			_	_					-			_				_				_						
40 1	7	BD	C	FYa 3258	French	2	8) 🚺 9	Э		2/60			40	10	10			T	T			2	.0	\square	ī —
41 1	8	BD	U	POIYa 3238	Professionally-oriented foreign language	1	9) 9	9		1/30			20	5	5			\top	-			1	.0	\square	_
42 1	9	BD	С	FYa 4259	French	2	10	0		10	2/60			40	10	10			+	-				2.0		
43 2	0	BD	С	AYaDSC 4223	English for special purposes	2	10	0		10	2/60			40	10	10			\top			\square		2.0		
44 2	1	BD	С	FYa 4260	French	2	1	1 1	1		2/60			40	10	10			\top			\square			2.0	
45 2	2	BD	С	AYaDSC 4255	English for special purposes	2	1	1		11	2/60			40	10	10			\top			\square			2.0	
46 2	3	BD	С	AYaDSC 4256	English for special purposes	2	1	2 1	2		2/60			40	10	10			\top							2.0
47 2	4 Socio-political	GED	R	PS 1103	Political Science and Sociology	4	1	1	1		4/120	20		20	16	64	4.0					\square				
48 2	5 disciplines	GED	R	KP 1104	Cultural studies and psychology	4	1	1	1		4/120	20		20	16	64	4.0					\square				
49 2	8	GED	R	SIK 1133	Modern history of Kazakhstan	5	1	1	1		5/150	20		30	20	80	5.0									
50 2	7 Social disciplines	GED	С	OAK 1116	Fundamentals of anti-corruption culture	5	3	3	3		5/150	20		30	20	80		- 6	.0							
51 2	8 Social disciplines	GED	С	VLO 1121	Introduction to Leadership in Education	5	3	3	3		5/150	20		30	20	80		6	.0							
52 2	9	GED	R	Fil 2106	Philosophy	5	6	6	8		5/150	20		30	20	80					5.0					
53 3	0	GED	R	FK 1107	Physical Culture.	2	1	1		1	2/60			60			2.0									
54 3	1	GED	R	FK 1113	Physical Culture.	1	2	2		2	1/30			30				1.0				\square				
55 3	2 Rhusiaal Culture	GED	R	FK 1114	Physical Culture.	1	3	3		3	1/30			30				1	.0							
56 3	3 Physical Culture	GED	R	FK 2130	Physical Culture.	2	4	ŧ.		4	2/60			60					2	.0						
57 3	4	GED	R	FK 2131	Physical Culture.	1	5	j		5	1/30			30						1.	0					
58 3	5	GED	R	FK 2132	Physical Culture.	1	6	3		6	1/30			30							1.0					
59 3	8	GED	R	IKT 1112	Information and communication technologies	2	2	2		2	2/60	20		20	10	10		2.0								
60 3	7	GED	R	IKT 1129	Information and communication technologies	3	3	3	3		3/90	30	30.0		20	10		3	.0							
61 3	8	BD	С	YaPAD 2261	Python language and data analysis	1	4	ţ		4	1/30	10	10.0		5	5			1	.0						
62 3	9	BD	С	YaPAD 2262	Python language and	2	5	5	5		2/60	20	20.0		10	10				2.	0					
63 4	0 Computer Spinson	BD	U	IAD 3203	Data Analysis Data Mining	2	7	7		7	2/60	20	20.0		10	10						2.0				
64 4	1 Computer Science	BD	С	ChM 3221	Numerical methods	2	7	7		7	2/60	20	20.0		10	10						2.0				
65 4	2	BD	С	ChM 3263	Numerical methods	1	8	8	8		1/30	10	10.0		5	5							1.0			
66 4	3	BD	U	IAD 3239	Data mining	2	8	3		8	2/60	20	20.0		10	10							2.0			
67 4	4	BD	U	IAD 3240	Data mining	2	9) / 9	9		2/60	20	20.0		10	10							2	.0		
68 4	5	BD	U	ITR 4224	Information technologies in crop production	3	10	0 1	0		3/90	30	30.0		20	10								3.0	1	
69 4	8	GED	U	OTOBZh 1134	Occupational safety and the basics of life safety	5	3	3 3	3		5/150	20		30	20	80		- 6	.0							
70 4	7	GED	С	OEP 1120	Fundamentals of Economics and Law	5	3	3 3	3		5/150	20		30	20	80		- 6	.0							
71 4	8	BD	С	MR 4217	Management in crop production	3	10	0 1	0		3/90	30		30	20	10								3.0	1	
72 4	9 Economic disciplines	BD	С	BUCH 4226	Accounting in agriculture	6	10	0 1	0		6/180	30		30	24	96								6.0	1	
73 5	0	BD	С	EOPA 4231	Economics and organization of agricultural production	5	10	0 1	0		5/150	20		30	20	80								5.0	1	
74 5	1	BD	С	OAP 4218	Fundamentals of agribusiness and entrepreneurship	5	1	1 1	1		5/150	20		30	20	80									5.0	
75 5	2	BD	С	MA 4230	Marketing in the agro-industrial complex	3	1	1 1	1		3/90	10		20	12	48									3.0	
76					Modules of the s	specia	lty/e	educati	iona	al progr	am															
77 5	3	BD	С	VS 1264	Introduction to the specialty	2	2	2 2	2		2/60	20			8	32		2.0								
78 5	4	BD	С	PUSK 3236	Programming of crop yields	5	8	8 8	8		5/150	20		30	20	80							5.0			
79 5	5	BD	С	OZ 3229	Fundamentals of land management	3	9	9 9	9		3/90	10		20	12	48							3	.0		
80 5	8	PD	С	BS 2331	Business statistics	3	4	4	4		3/90	10		20	12	48			3	.0						
81 5	7	PD	С	ZSK 3309	Protection of agricultural crops	3	7	7	7		3/90	30	30.0		20	10						3.0				
82 5	8	PD	U	Zem 3304	Agriculture	3	8	8 8	8		3/90	30	30.0		20	10							3.0			

82 58		PD	U	Zem 3304	Agriculture	3	8	8		3/90	30	30.0			20	10						3.0			
83 59		PD	С	EF 3325	Entomology and phytopathology	3	8	8		3/90	10	20.0			12	48						3.0			
84 60	Production of crop	PD	U	Ras 3302	Crop production	3	9	9		3/90	30	30.0			20	10							3.0		
85 61	production	PD	С	ChS 3327	Private breeding	8	9	9		8/240	40	40.0			32	128							8.0		
86 62		PD	U	SSK 4303	Selection of agricultural crops	4	10	10		4/120	40	40.0			20	20							1	4.0	
87 63		PD	С	ONI 4330	Fundamentals of scientific research	3	10	10		3/90	10		20		12	48								3.0	
88 64		PD	U	SSK 4335	Selection of agricultural crops	4	11	11		4/120	40	40.0			20	20								4	1.0
89 65		PD	U	Sem 4301	Seed science	3	11	11		3/90	30	30.0			20	10								3	5.0
90 66		PD	С	Ger 4326	Herbology	3	11	11		3/90	10		20		12	48								3	5.0
91 67		PD	С	ATR 4328	Adaptive technologies in crop production	6	11	11		6/180	20	40.0			24	96								C	i.0
92 68		PD	С	SSTSK 4322	Seed production and varietal technology of	3	12	12		3/90	30	30.0			20	10									3.0
93 69		BD	U	NOH 1205	Inorganic and organic chemistry	2	2	2		2/60	20	20.0			10	10	2	2.0							
94 70		BD	U	NOH 1241	Inorganic and organic chemistry	2	3	3		2/60	20	20.0			10	10		2.0							
95 71		BD	U	AFH 2206	Analytical and physic colloidal chemistry	2	4	4		2/60	20	20.0			10	10			2.0						
96 72		BD	U	AFH 2242	Analytical and physic colloidal chemistry	2	5		5	2/60	20	20.0			10	10				2.0					
97 73	Chemister	BD	U	AFH 2243	Analytical and physic colloidal chemistry	1	6	6		1/30	10	10.0			5	5				1.	.0				
98 74	Chemistry	BD	С	PH 3214	Applied Chemistry	3	7		7	3/90	30	30.0			20	10					3./	0			
99 75		BD	С	PH 3265	Applied Chemistry	2	8	8		2/60	20	20.0			10	10						2.0			
100 76		PD	С	UKH 3324	Advanced Chemistry course	3	9	9		3/90	30	30.0			20	10							3.0		
101 77		PD	С	UKH 4340	Advanced Chemistry course	3	10		10	3/90	30	30.0			20	10								3.0	
102 78		PD	С	UKH 4341	Advanced Chemistry course	2	11	11		2/60	20	20.0			10	10								2	2.0
103 79		BD	U	MKB 1207	Molecular and cellular biology	5	2	2		5/150	50	50.0			20	30	6	i. 0							
104 80		BD	U	GOF 1208	Genetics, ontogenesis, phylogeny	2	3	3		2/60	20	20.0			10	10		2.0					\square		
105 81		BD	C	OBO 1216	General biology of organisms	2	3	3		2/60	20	20.0			10	10		2.0							
106 82		BD	C	OBO 2266	General biology of organisms	3	4		4	3/90	30	40.0			10	10			3.0						
107 83		BD	U	MKB 2244	Molecular and cellular biology	1	4		4	1/30	10	10.0			5	5			1.0						
108 84		BD	С	OBO 2267	General biology of organisms	2	5	5		2/60	20	20.0			10	10				2.0					
109 85		BD	U	MKB 2245	Molecular and cellular biology	2	5	5		2/60	20	20.0			10	10				2.0					
110 86	Biology	BD	U	GOF 2246	Genetics, ontogenesis, phylogeny	3	6	6		3/90	30	40.0			10	10				3.	.0	<u> </u>	\square	$ \rightarrow $	
111 87		BD	С	BOR 2233	Biology	7	6	6		7/210	30	40.0			28	112				1.	.0				
112 88		BD	С	RKF 2234	of plant ontogenesis Plant compositions and floristics	5	6	6		5/150	20		30		20	80				5.	.0	<u> </u>	\square	$ \rightarrow $	
113 89		BD	U	UPPDOBO	Educational practice in the discipline "General	2	6			2/60				60						2.	.0	<u> </u>	\square	$ \rightarrow $	
114 90		BD	С	KKTR 3235	Culture of plant cells and tissues	7	7	7		7/210	30	40.0			28	112				\perp	7.)	\square	$ \rightarrow $	
115 91		BD	С	GR 3228	Plant genetics	10	8	8		10/30	40	60.0			40	160				\square	\perp	10.	\square	$ \rightarrow $	
116 92		BD	С	FBR 3227	Physiology and biochemistry of plants	5	9	9		5/150	20	30.0			20	80				\square	\perp	<u> </u>	5.0	$ \rightarrow $	
117 93		PD	U	KTRS 3307	Cellular technologies in crop production and breeding	3	9	9		3/90	30	30.0			20	10							3.0		
118 94		BD	U	PM 1209	Advanced Mathematics*	2	2	2		2/60	20		20		10	10	2	.0							
119 95		BD	U	PM 1247	Advanced Mathematics*	2	3	3		2/60	20		20		10	10		2.0							
120 96		BD	U	PM 2248	Advanced Mathematics*	2	4		4	2/60	20		20		10	10			2.0						
121 97		BD	U	PM 2249	Advanced Mathematics*	2	5		5	2/60	20		20		10	10				2.0					
122 98		BD	U	PM 2250	Advanced Mathematics*	2	6	6		2/60	20		20		10	10				2.	.0				
123 99	Math	BD	C	MMM 3217	Methods of mathematical modeling	3	7		7	3/90	30		30		20	10					3.	٥			
			1 - 1							-	-								·		_		·		

124 100		BD	CC	MMM 3272	Methods of mathematical modeling	2	8	8		2/60	20		20		10	10						2	2.0		
125 101		PD	CC	VP 3313	Probability and Application	2	8		8	2/60	20		20		10	10						2	2.0		
126 102		PD	CC	VP 3338	Probability and Application	2	9	9		2/60	20		20		10	10							2.	.0	
127 103		PD	CC	SOED 4309	Statistical processing of experimental data	2	11		11	2/60	20		20		10	10									2.0
128 104		PD	CC	SOED 4337	Statistical processing of experimental data	2	12	12		2/60	20		20		10	10									2.0
129 105		BD	UC	OF 1210	Fundamentals of Physics	2	2	2		2/60	20	10.0	10		10	10	2	2.0							
130 106		BD	UC	OF 1251	Fundamentals of Physics	2	3	3		2/60	20	10.0	10		10	10		2	.0						
131 107		BD	CC	OTE 2225	Fundamentals of Thermodynamics and	2	4	4		2/60	20	20.0			10	10			2.	0					
132 108		BD	CC	OTE 2268	Fundamentals of Thermodynamics and	2	5		5	2/60	20	20.0			10	10				2.0					
133 109	Physics	BD	CC	OTE 2269	Fundamentals of Thermodynamics and	1	6	6		1/30	10	10.0			5	5					1.0				
134 110	Filysics	BD	CC	Bio 3216	Biophysics	2	7		7	2/60	20	10.0	10		10	10						2.0			
135 111		BD	CC	Bio 3270	Biophysics	2	8		8	2/60	20	10.0	10		10	10						2	2.0		
136 112		BD	CC	Bio 3271	Biophysics	3	9	9		3/90	30	20.0	10		20	10							3.	.0	
137 113		PD	CC	UKF 4316	Advanced Physics course	3	10		10	3/90	30	30.0			20	10								3.0	
138 114		PD	CC	UKF 4339	Advanced Physics course	3	11	11		3/90	30	20.0	10		20	10									3.0
139 115		BD	UC	Agr 2252	Agrometeorology	2	4		4	2/60	10	20.0			8	22			- 2.	0					
140 116		BD	UC	Agr 2253	Agrometeorology	3	5	5		3/90	20	30.0			12	28				3.0					
141 117	Rational use of	BD	UC	EUR 2254	Ecology and sustainable development	4	6	6		4/120	40		40		20	20					4.0				
142 118	biological resources	PD	CC	OTZ 3329	Fundamentals of precision farming	4	7	7		4/120	20	20.0			16	64						4.0			
143 119		PD	UC	PA 3334	Soil science and agrochemistry	2	7		7	2/60	20	20.0			10	10						2.0			
144 120		PD	UC	PA 3336	Soil science and agrochemistry	3	8	8		3/90	30	30.0			20	10						3	3.0		
1.45					Additional mode	lee hea	and the	o auali	ficatio																
143					Additional mode	nes vey	Olio uli	e quai	in caulo																I
145					Mo	dules by	y choic	e quai e	- Callo																
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143 146 147 148			A	verage weekly wo	Mo Mo Res	dules by earch w	y choic ork (R	e quali æ W)									<mark>57</mark> (8	30 📕	0 788	60	99	93		0 10	10 21
145 146 147 148 149	1		A	verage weekly wo Gener	Montonal Mod Mo Res vrkload in hours al education disciplines (GED)	dules by earch w	y choic ork (R)	e qual æ W) 17	11	2130	210	30	880	0	282	728	<mark>57</mark> (: 19	30 1 7 2	0 60 6 6	60 5	<mark>99</mark> 8	93	0 0	0 10) 0	10 21 0 0
143 146 147 148 149 150	1		A	verage weekly wo Gener Rec	rkload in hours al education disciplines (GED) quired component(GED/RC)	dules by earch w 71 51	y choic ork (R)	e qual æ W) 17 13	11 11	2130 1530	210 130	30 30	880 760	0	282 202	7 <u>28</u> 408	<mark>57</mark> († 19 19	10 7 2 7 (0 60 6 6 8 6	60 5 5	<mark>99</mark> 8 8	<mark>93</mark> 0) 10) 0	10 21 0 0 0 0
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175	Exam	s (semester)* - The final fo	om of co	ntrol is	n Phy	sical cultu	re an	n <mark>d typ</mark>	es of p	rofess	ional p	practi	tice is	is a diff	ferent	tiated	l cred	lit.																												
176																																														
177	Then	odular curriculum is com	piled in	accord	lance	with the st	anda	ard cur	riculu	an of t	he sper	cialty	y (ap	prover	d by	the C	Drder	of the	Min	istry	ofEd	lucati	on a	nd Ś	cience	e of t	the R	epubl	ic of K	azakh	stan	dated	16.08	201	3 No	. 347	3),									
178	SSE (approved by the Order of	the Mir	istry o	ofEdu	cation and	Scie	ance o	f the R	epubl	ic of K	azaki	chstar	an dater	d 23.	08.20	0121	No. 10)80), ;	amod	dular	educa	ation	ial pr	rogran	nof	the s	pecial	ty.							T	1									
179	The n	odular curriculum was re	viewed	and app	prove	d at the me	eting	g of th	e meth	odolo	gical (comm	nissi	ion of t	the fa	culty	, Pro	toco1	No.	from	120_	g.							1																	
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185	Head	of the Department																		Tu	rbeko	va Ar	rsgul	Sapa	ralievr	na -																				
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Appendix 3. The interrelation of the achievability of the formed learning outcomes according to the educational program and academic disciplines (Matrix of the influence of disciplines on the formation of learning outcomes)

	Name of the discipline	Brief description of the discipline	Кол-во															
N₂	-		кредито	ON														
			В	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Cycle of general education disciplines																
		University component/Component of choice																
	Introduction to Leadership in Education	Models of effective leader communication. Management methods in critical situations. Methods of work in the	5		v													
	r · · · · ·	management team and the principles of distribution of roles in																
		the team. Methods of effective control and motivation of																
		learning. Theory of leadership qualities. Concepts of leadership																
		behavior (three leadership styles (K.Levin), Ohio State																
		University research, University of Michigan research,																
		management systems (R. Likert), management grid (Blake and																
		Mouton), the concept of reward and punishment, leadership																
		substitutes (S.Kerr and J.Germier).																
	Occupational safety and	Formation of students' knowledge and practical skills to create	5			v												
	the basics of life safety	safe and harmless living conditions, to prevent the causes and																
		conditions of dangerous situations, to protect the population and																
		production personnel and national economy facilities from the																
		possible consequences of emergencies. Features of labor																
		protection of women and youth, supervision and control of the																
		implementation of labor protection legislation and responsibility																
		for violation of labor protection requirements.																
	Fundamentals of anti-	Theoretical and methodological foundations of the concept of	5		v													
	corruption culture	"corruption" Improvement of socio-economic relations of the																
		Kazakh society as a condition for combating corruption																
		Psychological features of the nature of corrupt behavior																
		Formation of anti-corruption culture Features of the formation																
		of anti-corruption culture of youth Ethnic features of the																
		formation of anti-corruption culture Moral and ethical																
		responsibility for acts of corruption in various fields. Legal																1
	Eundomontolo of	The subject of economic theory and recovery methods	-															
	Fundamentals OI	The subject of economic theory and research methods.	Б		v													
	Economics and Law	Fundamentals of social production and forms of social																

		economy. The mechanism of functioning of the market system. Production, costs and income of the company. National												
		economy. Economic growth and instability of the market												
		economy. Inflation and unemployment are manifestations of												
		economic instability. Financial and monetary system in the												
		national economy and economic security. Fundamentals of the												
		theory of state and law. Fundamentals of constitutional,												
		administrative, civil, labor, family, and criminal law.												
		Cycle of basic disc	iplines	II	 	II	 	I	I	I	 I	I	I	
		University compo	nent		 		 				 			
	Analytical and physic	The course forms students' ideas about the theoretical	5			v								
	colloidal chemistry	foundations of analytical chemistry, its connection with other												
	conordal chemiou y	applied sciences and practical significance. Introduces the latest												
		achievements in the field of analytical and physicolloid												
2		chemistry, with modern methods of detection, separation and												
		determination of chemicals. The discipline gives the student a												
		holistic view of the analysis methods used for express and												
		holistic assessment of the content of chemicals in environmental												
		objects.												
	Inorganic and organic	Knows the basic laws of chemistry, the structure and properties	4			v								
	chemistry	of matter, patterns and features of chemical processes,												
		thermodynamics, solutions, properties of elements; understands												
		marginal and unsaturated aliphatic hydrocarbons, aromatic												
		hydrocarbons, halogen-derived hydrocarbons, oxygen-,												
		nitrogen-containing organic compounds: alcohols and esters,												
		aldehydes and ketones, carboxylic acids; applies general												
		concepts about oxo- and amino acids, amines and diazo												
		compounds.												
	Genetics, ontogenesis,	Knows the field of genetic information and its meanings;	5					v						
	phylogeny	understands the molecular nature and way of expressing genetic												
		information, development, determinism of development with its												
		genetic aspects; analyzes its crucial importance at the cellular												
		level and its central role in heredity, the growth and												
		development of the organism, from fertilization to adulthood,												
		and to the end of life, the study of changes in genetic												
		information ranging from the molecular nature of various												
		mutations to the evolution of living organisms, including												
		changes in the genome of individuals and populations; evaluates												

	population genetics models and speciation mechanisms.											
Data mining	The discipline studies NumPy linear algebra functions,	6			v							
	mathematical algorithms and SciPy functions for data											
	processing and visualization, Matplotlib — a library for creating											
	2D graphs in Python, R and RStudio environments, data access											
	operators, functions and arguments, loops and conditional											
	operators, R DBMS, parameter, statistical calculations and											
	graphs in R.											
Advanced	The course covers all the necessary sections of mathematics:	10					v					
Mathematics*	elements of mathematical logic and number theory, the theory											
wiathematics	of complex numbers, linear algebra for the finite-dimensional											
	case; differential and integral calculus of functions of one											
	variable, ordinary differential equations of the first and second											
	order, numerical series, introduction to probability theory, as											
	well as numerical solution of mathematical problems											
Professionally-	The course provides for the formation of students' ability to	4	v									
anianta di fanai an	communicate in a foreign language in specific professional.											
	business, scientific fields and situations, taking into account the											
language	peculiarities of professional thinking, when organizing											
	motivational and motivational and research activities.											
Introduction to the	The course introduction to the specialty studies the basics of	4							v			
	agronomy, the history and development of agronomy, soil											
specialty	fertility and vield, plant living conditions and methods of their											
	regulation. To acquaint students with farming systems, crop											
	rotation, weed control measures, tillage techniques and systems.											
	features of the use of fertilizers to increase the yield and quality											
	of crops crop cultivation technology											
Molecular and cellular	Knows the structures of molecules in living organisms before	8						v				
	their functioning inside cells: understands the functioning of	0						•				
Diology	living organisms at the micro-level using the concents of											
	chemistry and physics: applies the properties of membranes and											
	their molecular organization in connection with the organization											
	of cells: analyzes the laws of kinetics and thermodynamics with											
	the main features of cellular bioenergetics: evaluates the											
	problems of heredity and variability at the level of molecular											
	organization the body											
Information technologies	The discipline is aimed at studying the role and tasks of	3			v		v					
in crop production	information technologies in crop production knowledge of the	5			*		•					
In crop production	mormation technologies in crop production, knowledge of the						1					

	main directions of agricultural informatization, the use of								
	geoinformation technologies in crop production, the creation of								
	databases for the production of crop products, the study of								
En demontele of Director	statistical and applied programs for agriculture.	4		 					
Fundamentals of Physics	Knows the branch of physics that studies the motion of material	4			v				
	thermodynamics: understands the elements of mechanics of								
	liquids and gases mechanics of solid and elastic bodies								
	mechanical vibrations and waves: applies dynamic and								
	kinematic methods of describing mechanical systems,								
	conservation laws in mechanics, basic laws of hydrodynamics,								
	laws of statistical physics; analyzes ideal gases, physics of real								
 	gas, atmospheric air	_		 					
Python language and	The course is dedicated to an in-depth study of the Python data	3		v					
data analysis	structure, introduces classical programming paradigms and								
	and its algorithms, students use these in-depth studies to solve								
	specific problems. An introduction to SQL queries and Web								
	database applications completes the year.								
	Цикл базовых дисциплин								
	Cycle of basic disciplines								
	Component of choiceКомпонент по выбору	-							
Fundamentals of	The course examines the concept, essence and economic	5	v						
agribusiness and	content of agribusiness. Features of agricultural								
entrepreneurship	production. The content of agribusiness in the Republic of								
	Kazakhstan. Features of agribusiness. The structure of								
	agriculture and agribusiness. Natural-biological and socio-								
	economic features of the formation of agribusiness and								
	agricultural production. Prospects for the organization of								
	small and medium-sized businesses in the agro-industrial								
	complex.								
	-								
Economics and	The purpose of the course is to form students'	5	v						
organization of	comprehensive understanding of the content of the								
agricultural production	economy and the organization of production. Course								

	objectives: Study of methods, rules and techniques of rational organization of the production process in space and time											
Marketing in the agro- industrial complex	The main provisions of the theory of marketing. The structure of agribusiness and features of marketing in the agro-industrial complex. Marketing management in the agro-industrial complex. Agromarketing technology. Informational agromarketing. Marketing strategy of the enterprise. Price marketing in agribusiness. Sales marketing in agribusiness. The effectiveness of marketing activities in agribusiness.	3		v								
English for special purposes	The discipline is aimed at studying general scientific terminology and terminology for the language of the relevant specialty in English, forms skills in four types of communicative activity: reading with a full understanding of authentic texts in the specialty, the ability to write an essay on a specialty problem, the ability to listen to authentic messages containing professional information, the ability to discuss specialty issues	6	v									
Programming of crop yields	This course examines the issues of crop yield programming, various methodologies for designing computer decision support systems in agronomy, as well as data analysis of the projected crop yield based on a balance model.	5						v	v			
Accounting in agriculture	Features of accounting in agriculture : IFRS 41 "Agriculture". Features of accounting for biological assets. Accounting for seeds, feed and other materials. Accounting of animals on cultivation and fattening. Accounting of agricultural products and their sale. Calculation of the cost of crop production and animal husbandry. Preparation of financial statements and formation of financial results in agriculture.	6		v								
Biophysics	Biophysics considers the physico-chemical phenomena occurring in living organisms that underlie elementary life processes, as well as the effects of physical factors on the body. The main task of biophysics is to study the processes associated with the transformation of the chemical energy of the components of living matter into other types of energy - mechanical and osmotic work, electrical and radiation energy.	7				V	v					

Culture of plant cells and tissues	The discipline gives students an idea of modern methods of non-traditional agriculture and plant growing - obtaining economically useful product by cultivating cells, tissues, organs of higher plants. This discipline introduces students to the molecular biological foundations of biotechnology, experimental morphogenesis, and the practical application of biotechnological techniques. The discipline helps students acquire the skills they will need in the practical work of modern production.	7				V			
Fundamentals of land management	The discipline forms knowledge on the methodological foundations and the general theory of the laws of development, contents, types, principles, tasks of land management in agriculture. Considers the land fund, land ownership and land use as a subject of land management, its natural, economic and social factors, the historical report of land management, agrarian policy and land management in modern conditions, the development of land management science.	3				v			
Applied Chemistry	In the course of applied chemistry, students deepen their theoretical knowledge and form new practical skills. For example, the regularities of formal kinetics studied in the first year are applied to open reactors, redox processes are supplemented by the study of E-pH diagrams. The following issues are also considered: high-molecular compounds and radicals, examples of production of chemical technologies.	5		v					
Methods of mathematical modeling	The discipline will allow students to use mathematical methods to study various processes. The course contains the following sections: fundamentals of power series; application of power series to generating functions and discrete variables, integration on intervals: numerical	5			v				

	algorithms in linear algebra, diagonalization of endomorphism and square matrices, mathematical modeling.								
General biology of organisms	Knows the general biology of organisms and the general laws of the phenomena of life of all organisms; understands the biology of living organisms, plant ecology, animal ecology, biology of bacteria and fungi, their interactions with other organisms and soil biocenosis; analyzes the mechanisms of living organisms on specific examples of biological functions related to zoology, botany, animal physiology and plant physiology; evaluates scientific and practical (for example, agronomic) importance of the topics under consideration.	7				v			
Plant compositions and floristics	The history of the formation of flower arrangements. Stylistic directions of floristry and phytodesign. The art of flower arrangement. The basics of building flower arrangements. Basics of working with fresh flowers and dried flowers. Compositions in the European style. "Shapes" in a floral arrangement. Construction of a planar and three-dimensional composition for offices and residential interiors. Types of floristry.	5				v			
Management in crop production	The course examines the basic concepts and categories of management, theory and practice of developing and making managerial decisions in economic entities of various forms of ownership in the areas of managing functional processes in the organization, implementing investment projects, managing small groups and collectives, improving the efficiency of the organization and interaction with the external environment.	3	v		v				
Biology of plant ontogenesis	The discipline is aimed at familiarizing students with the laws of reproduction and individual development of organisms as the fundamental basis of life processes. The course gives an idea of the macro- and	7				v			

	micromorphological, physiological-biochemical, molecular and genetic processes occurring in developing organisms, as well as the factors and mechanisms governing the processes of development at all stages of plant organisms' ontogenesis.										
Physiology and	Plant physiology and biochemistry studies the processes	5									
biochemistry of plants	of vital activity, functions of the plant organism, chemical composition, transformation of substances and energy in plants throughout their ontogenesis under all possible environmental conditions. Intensive use of mineral fertilizers, herbicides, physiologically active substances, chemicals to protect plants from diseases and pests requires a deep and comprehensive study of their effect on the growth and metabolism of plant organisms in order to significantly increase the productivity of agricultural plants. Plant physiology is the basis of all agronomic sciences (agriculture, plant growing, vegetable growing, etc.), creates the theoretical basis of agrotechnical systems aimed at increasing the yield and quality of agricultural						v				
Plant genetics	The discipline studies cytological, molecular cytoplasmic	10									
	variability of genetic material, fundamentals of population genetics, cellular and genetic engineering, types of hybridological analysis.						v	v			
Numerical methods	The course covers the basics of numerical modeling, solving applied problems leading to simple differential equations (DDC) and differential equations with separate	3		v		v					

	derivatives (DGD), integration of three diagonal systems of algebraic equations, DCK and GDT (scipy.integrate). In Python, DCC and GPD are taught to use numerical solutions, finite difference methods.										
Fundamentals of	Knows the basic concepts, research methods and	5									
Thermodynamics and	parameters of thermodynamic systems; understands										
Electromagnetism	equilibrium and non-equilibrium processes, reversible and										
	irreversible processes, polytropic processes, entropy, the										
	second principle of thermodynamics, transfer phenomena,					v					
	the main task of electrostatics, electromagnetism; applies					·					
	the Gauss Theorem, capacitors, electric and magnetic										
	fields, Ohm's laws; analyzes elements of geometric and										
	wave optics, quantum optics, atomic and nuclear physics.										
French	The discipline is aimed at mastering the vocabulary and	10									
	linguistic features of the French language by students and										
	the formation of intercultural and communicative		v								
	competence of students in the process of foreign language										
	education.										
	Cycle of profile disc	ciplines									
	University component/Com	ponent o	f cho	ice							
Agrometeorology	The course of the discipline contains agrometeorological	5						v			
	observations and instruments for measuring										
	agrometeorological indicators, methods of										
	agrometeorological assessment of the growing season of										
	crops, agro-climatic assessment of the territory for crop										
	production purposes, agrometeorological forecasts,										
	adverse weather phenomena and ways to mitigate their										

	harmful effects on agricultural plants.									
Selection of agricultural crops	The discipline is designed to give the student knowledge about breeding as a science and branch of agricultural production, about the source material for breeding, about methods of creating populations for selection, about the use of biotechnology methods in plant breeding, about methods of selection from crops with various methods of pollination and reproduction, about varietal studies as a science of varieties, about methods of evaluation of breeding material, about methods of creating heterosis hybrids, about State testing of varieties, about the regulatory framework, theoretical foundations of seed production, ways to maintain the genetic structure of the variety, propagation, certification of seeds, preparation of relevant documentation.	8				v				
Agriculture	The discipline studies the laws of agriculture, ways to increase soil fertility, optimization of agricultural regimes, scientific foundations of crop rotation, classification, zonal features, introduction and development of crop rotations, scientific foundations of tillage, zonal features of tillage, agrotechnical assessment of the quality of tillage.	3					v			
Crop production	The discipline "Crop production" introduces students to the morphological and biological features and agrotechnics of cultivating crops that allow for maximum yield per unit area, helps in solving organizational and economic issues for making adjustments to agrotechnical techniques in the production of crop products, taking into	3			V					

	account the prevailing weather conditions of a particular										
	year, taking into account world scientific achievements.										
Cellular technologies in crop production and breeding	The course studies methods of cultivation of plant cells and tissues depending on experimental tasks for targeted use in breeding; genetic engineering and cellular technologies in plant production, documentation on registration of experimental data, international databases of genetic resources NCBI, GenBank, Cell selection; identification of transgenic insertion in plant biomaterial; experimental haploidy of agricultural plants, achievements of cellular technology engineering and cell selection for solving practical problems of crop production	3				v		v			
Soil science and agrochemistry	The course studies the general scheme of the soil-forming process and factors of soil formation, mineralogical, granulometric and chemical composition of soils, general physical and physico-mechanical properties of soil, etc. The student masters the methods of plant diagnostics of conditions of mineral nutrition of plants, varieties of mineral and organic fertilizers and their composition, as well as the basics of fertilizer application.	5					v				
Seed science	The study of the discipline "Seed Science" provides agronomic knowledge about modern issues of seed science: morphology, physiology and biochemistry of seeds; features of the formation of their different quality, the sowing - germination period: swelling of seeds, formation of seedlings, emergence of seedlings, adaptive properties acquired by seeds in the process of swelling and formation of seedlings, methods of harvesting and methods of drying seeds, modern methods evaluation of the quality of seeds and seed material.	3						v			
Protection of agricultural crops	In the course of mastering the discipline, the student knows the systematic organization of measures to combat pests, diseases and weeds of agricultural crops, to preserve and increase the yield and quality of agricultural crops, taking into account the relationship of pests and pathogens of agricultural crops with plants, biological characteristics, factors limiting harmfulness.	3					v				
Business statistics	The subject and methods of statistics. Statistical observation, systematization of data and their presentation. Statistical grouping, tables. Absolute and relative indicators, their	3	v		v						

	graphical representation. Average values and indicators of variation. Selective method in statistical studies of business processes. Statistical hypothesis testing. Random variables and probabilistic models. Statistical study of the dynamics of business processes. Economic indices. Statistical study of the interrelation of social phenomena. Software tools for statistical processing and data analysis (IBM SPSS, STATISTICA, MS Excel).								
Herbology	The course provides for the formation of in-depth professional knowledge in the field of studying the patterns of weed plant associations and their harmfulness in the cultivation of major crops. Methods of selection and analysis of weed plant samples, identification and description of weed plant diversity, assortment of herbicides of domestic and foreign production, methods of evaluating the effectiveness of plant protection products and methods.	3				ž			
Fundamentals of scientific research	The concept of science. The content of science. Methodology, methodology and research process. General information about science. Methodological foundations of scientific knowledge. Empirical and theoretical levels of scientific knowledge. Organization of research. General information about R&D. Organization of research work of students. Experimental research in economics. Processing of experimental data.	3				v			
Fundamentals of precision farming	Familiarization with precision farming technologies; - study of agricultural machines for precision farming technologies; study of the latest laboratory equipment, GPS systems that ensure the implementation of precision farming technologies; Conducting an analysis of the economic efficiency of parallel and automated driving systems and the formation of practical skills to work with GIS technologies.	4		v		J			
Private breeding	The course is aimed at developing students' skills in using ideas and knowledge, the peculiarities of conducting the breeding process of individual crops of agricultural plants,	8				v			

	taking into account zonal features and environmental orientation.										
Adaptive technologies in crop production	The course Adaptive technologies in crop production is aimed at studying soil and climatic conditions, features of the development of field crops, requirements for environmental factors and the creation of technological processes for managing growth, development and formation of a high-quality crop.	6						v			
Seed production and varietal technology of agricultural crops	The discipline "Seed production and varietal technology of agricultural crops" forms the theoretical and practical knowledge necessary for the organization of the production of varietal seeds and develops organizational forms and technological techniques for obtaining high-quality seeds of varieties and hybrids of agricultural crops. The study of the discipline course is based on basic knowledge of other biological sciences, especially such as genetics, physiology, cytology, biochemistry, breeding, etc.	3					v				
Advanced Physics course	An advanced course in physics forms ideas about the picture of the world, natural phenomena and processes, and ways to describe them. In the course of mastering the content of the discipline, students have the opportunity to develop ideas about natural phenomena and processes, laws, relationships and interactions, as well as get an idea of models of physical processes and phenomena that explain their essence.	6				v					
Advanced Chemistry course	The knowledge gained in the first and second courses is being deepened. The course consists of three parts: general, inorganic and organic chemistry. The general chemistry section discusses reaction mechanisms, binary diagrams, and colloidal systems. In the section of inorganic chemistry, attention is paid to redox reactions, electrochemical systems. Additions to the structure of molecules, spectroscopy issues are considered in the section of organic chemistry.	8			v						
Probability and Application	The course is a continuation of the advanced mathematics sections in the field of probability theory. The discipline will	4		1	7						

	allow students to use mathematical methods to study various processes. The course contains the following sections: discrete random variables, continuous random variables, regression analysis, correlation analysis, variance analysis, nonparametric methods of analysis between quantitative and qualitative variables.								
Ecology and sustainable development	The discipline is aimed at studying the ecological foundations and laws of the development of nature and humanity, analyzing global environmental problems and solving them within the framework of sustainable development of society and the environment. The acquired knowledge of natural laws is aimed at preserving a favorable environment in the interests of present and future generations.	3	v						
Statistical processing of experimental data	This course is devoted to statistical and graphical methods of data analysis using application software packages. The course includes such sections as numerical methods for solving linear differential equations; Euclidean structures; theory of functions of several variables, examples of dynamic systems in modeling, statistical data, descriptive and graphical methods of data analysis.	3			v				
Entomology and phytopathology	Types of plant diseases. The harmfulness of diseases. Types of pathogens. Phytopathological bacteria, viruses. Pathological flowering plants. Mycoplasma. Phytopathogenic nematodes. Fungi as pathogens. Biological and ecological features of insects. Fundamentals of plant protection from harmful insects (biological, forestry, chemical, physical, accounting methods, etc.).	3				v			

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