Intended learning outcomes: Competence code and name Code and name of the indicator of competence achievement	Name of topics	Types of work (hours)					Teaching/Learning forms	Forms of assessment
		Contact work				Individual work		
		Lectures	Lab works	Practical works	Other (e.g. consultation)			
	Semester							
Competence 1 (K1) Be able to conduct comprehensive research that includes transdisciplinarity and use modern methods to study the qualitative and quantitative aspects of climate change in order to promote agricultural sustainability. **Competence 2 (K2)** Capable of developing and implementing techniques and models for sustainable development of crop and livestock production systems to ensure food security in the face of climate change.	**Topic 1. Climate change impact on agricultural production systems**							
	1.1. Global climate change and its impact on crop and livestock production systems (developers: Aliya Baitelenova, Dinara Seidazimova)	2					Lecture-discussion	Survey in the form of open tests
	1.2. Ways of adaptation of crop and livestock production systems in conditions of climate change (developers: Vasyona Ustinova, Marat Ongayev)			2			Round table	colloquium
	1.3. Development of new technologies in crop and livestock production taking into account climate change in the world					4	Independent work review of innovative technologies in the world	
	1.4. Research of climate change impact on crop and livestock production systems (review of recent scientific achievements) (developers: Iglik Zhumagulov)	2					Problem lecture	Test tasks
	1.5. Ecological consequences of modern methods when used in the agricultural system (developers: Aliya Nagiyeva, Dinara Seidazimova)			2			Seminar - conference	discussion
	1.6. Strategies and tactical solutions of scientific research and practical tasks in the system of crop and livestock production under conditions of climate change					4	Independent work - presentation	
	1.7. Peculiarities and prospects of application of fertilizer systems in innovative resource-saving crop cultivation technologies under climate change aridisation (developers: Alexandr Esaulko, Olga Lobankova)	2					Lecture-visualisation	oral survey
	1.8. Study of a model for sustainable development of crop and livestock production systems (developers: Inga Riumkina, Gulnara Yunusova)			2			Practical-oriented lesson	creative project (creation of sustainable development models for compliance with parameters)
	1.9. Implementation of research results to ensure food security in the context of climate change					4	Independent work - development of scientific article	
Competence 1 (K1)	**Topic 2. Climate change effects on food security**							

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		Contact work				Individual work		
		Lectures	Lab works	Practical works	Other (e.g. consultation)			
Be able to conduct comprehensive research that includes transdisciplinarity and use modern methods to study the qualitative and quantitative aspects of climate change in order to promote agricultural sustainability. **Competence 2 (K2) Capable of developing and implementing techniques and models for sustainable development of crop and livestock production systems to ensure food security in the face of climate change.**	2.1. Social and historical aspects of the global food problem. Losses in agriculture due to climate change (developers: Olga Altaeva, Bulat Tsydypov)	2					Lecture - discussion	oral survey
	2.2. Definition of specialization and productive forces in the global food system (developersIglik Zhumagulov)			2			Block Seminar	Solving situational problems
	2.3. Economic, environmental, social, natural and climatic, and man-made risks (developers: Damira Aitmuhanbetova, Marat Ongayev)			2			Case study	Solving situational problems
	2.4. Contemporary trends in ensuring food security through national management systems					6	Self-study training materials in the form of a group work	colloquium
	2.5. Food supply for humanity at the present stage of development. Reducing losses in agriculture by applying "smart" technologies (developers: Saule Essengazieva, Inga Riumkina)	2					Lecture-visualization	recitation by lecture, with reports on the topic
	2.6. Advanced research related to climate change and food security (developers: Aliya Baitelenova, Gulnara Yunusova)			2			Tick-box	Test
	2.7. Population income and economic availability of food (developers: Aigul Ismailova, Aliya Nagiyeva)			2			Brainstorm	Solving problems
	2.8. World policy and international activities in the field of food supply in the context of developed and developing countries					6	Independent study of training materials in the form of supporting notes	colloquium
Competence 2 (K2) Capable of developing and implementing techniques and models for	**Topic 3. Sustainable resources management (water, ecosystems, land management)**							
	3.1. Using innovative measures in sustainable use and management of water resources in agriculture (taking into account regional specifics) (developers: Marat Ongayev, Nyukkanov Ayan)	2					Problem lecture	oral survey
	3.2. Principles of sustainability and evaluation of adaptive measures.			2			Seminar - debate	colloquium

Intended learning outcomes: Competence code and name Code and name of the indicator of competence achievement	Name of topics	Types of work (hours)					Teaching/Learning forms	Forms of assessment
		Contact work				Individual work		
		Lectures	Lab works	Practical works	Other (e.g. consultation)			
sustainable development of crop and livestock production systems to ensure food security in the face of climate change.	Agroecological analysis and development of the plan of agrolandscape optimization (developers: Elena Shatalova)							
	3.3. Assessment of natural and economic risks in conditions of climate change (by examples of agro-industrial complex) (developers: Ainura Aldiyarova, Yuliya Borissova)			2			Practical lesson	oral survey
	3.4. Sustainable Water Resources Management Strategy					6	Independent work (preparation of a presentation)	
	3.5. Soil Resources. Integrated soil fertility management (developers: Aliya Nagiyeva)	2					Lecture-visualization	oral survey
	3.6. Analysis of innovative measures aimed at risk reduction based on the assessment of environmental hazards of land use (developers: Nyukkanov Ayan)			2			Seminar-discussion	oral survey
	3.7. Development of recommendations on agrolandscapes sustainability based on biota transformation assessment (developers: Svetlana Okrut, Gulnara Yunusova)			2			Case study	slide presentation of project results
	3.8. Problems of sustainable land use (on the example of a region)					6	Independent work (preparation of a scientific article)	
Competence 1 (K1) Be able to conduct comprehensive research that includes transdisciplinarity and use modern methods to study the qualitative and quantitative aspects of climate change in order to promote agricultural sustainability.	**Topic 4. Environmentally friendly crop production (healthy agricultural products)**							
	4.1. Biological protection of plants (developers: Larisa Korobova, Olga Altaeva)	2					Lecture-visualization	oral survey
	4.2. Features of obtaining environmentally friendly products (developers: Larisa Korobova)			2			Practice-oriented lesson	colloquium
	4.3. Production and introduction of microbiological preparations for plant production (developers: Dinara Seidazimova, Elena Drepa)			2			Practical lesson with the involvement of expert practitioners	oral survey
	4.4. Measures to ensure stabilization of agroecosystem productivity and biodiversity conservation in modern organic agriculture (developers: Agafya Platonova)					6	Independent study of training materials in the form of group work	Protection of projects
	4.5. Breeding as a tool for maintaining sustainability and safety of crop production (developers: Aliya Kushenbekova, Asiya Ansabaeva)	2					Lecture - discussion	oral survey
	4.6. Development of ecological agrochemistry			2			Seminar-conference	Colloquium

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		Contact work				Individual work		
		Lectures	Lab works	Practical works	Other (e.g. consultation)			
Competence 2 (K2) Capable of developing and implementing techniques and models for sustainable development of crop and livestock production systems to ensure food security in the face of climate change.	(developers: Aliya Nagiyeva, Platonova Agafya, Bulat Tsydypov)							
	4.7. Ecological risks of agro-technologies (developers: Aliya Nagiyeva Dinara Seidazimova)			2			Case study	Solving situational problems
	4.8. Sanitary and hygienic assessment of food raw materials and food products of plant growing. Substances that contaminate foodstuffs and forages (developers: Agafya Platonova)					6	Independent study of training materials in the form of supporting notes	oral survey
Competence 2 (K2) Capable of developing and implementing techniques and models for sustainable development of crop and livestock production systems to ensure food security in the face of climate change.	**Topic 5. Sustainable livestock systems and animal welfare**							
	5.1. Principles of sustainable animal husbandry (developers: Indira Aitzhanova)	2					Lecture-discussion	oral survey
	5.2. Risk Factors for reducing well-being in the context of climate change (developers: Beibit Kulatayev, Abzal Abdramanov)			2			Practical training with the involvement of expert practitioners	discussion with representatives of production
	5.3. Adaptation of the livestock system to climate change (developers: Konstantin Zhuchaev)			2			Round table	colloquium
	5.4. Improvement of innovative technologies in animal husbandry in connection with climate change					6	Independent work-development of a research project, preparation of a selection and breeding plan	
	5.5. Animal Welfare and its components (developers: Abzal Abdramanov)	2					Problem lecture	oral survey
	5.6. Quality management model of management processes in animal husbandry (developers: Bostanova Saule)			2			Practice-oriented lesson (departure to the enterprise)	Misc: - the decision of situational problems; analysis of situations; - test control
	5.7. Ecological consequences of modern methods of animal husbandry (developers: Faruza Zakirova)			2			Seminar-conference	Discussion-dialogue with farmers and leading experts in the field of animal

Intended learning outcomes: Competence code and name Code and name of the indicator of competence achievement	Name of topics	Types of work (hours)					Teaching/Learning forms	Forms of assessment
		Contact work				Individual work		
		Lectures	Lab works	Practical works	Other (e.g. consultation)			
								husbandry and ecology
	5.8. Animal husbandry and the natural environment					6	Independent work-preparation of a scientific article (thesis)	