



CATALOG OF ELECTIVE DISCIPLINES
 For students in the direction of preparation 7M087 Agricultural engineering
 Brief description of the elective disciplines of the educational program

EPC	EP	Form of education	The name of discipline	Code of subject	Discipline cycle	Component	Number of credits	Level of training by specialization (Scientific & pedagogical direction)	Cafedra	Course	Academic period	Pre-requisites	Post-requisites	Brief content of the discipline	Key learning outcomes	Name of the alternative
M136-«Vehicle»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Optimization of mineral nutrition of crops	OMPSK 5206	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Soil science and agricultural chemistry	1	3	Farming systems and crop production, Technical support of technological processes in the system of precision farming, Theoretical foundations of the mechanization of agricultural production	Agricultural soil science, Physics and chemistry of soils, Physioanatomy monitoring of pests, Physioanatomy technologies of crops cultivation	The role of fertilizers in the management of soil fertility, productivity and quality of agricultural crops. Foreign experience in optimizing nutrition. Nutrition as one of the most important factors of plant life and methods of nutrition management. Influence of fertilizers on physical and chemical properties of soil and plant nutrition. Methods for determining the need of crops for fertilizers and their assessment. Diagnostic indicators of soil supply with nutrients. Optimization of nitrogen, phosphorus and potassium nutrition conditions. Methods of purposeful management of soil fertility and crop productivity. The method of constructing an optimized fertilizer system. Economic and environmental justification of methods of optimization of mineral nutrition of crops, ensuring the implementation of their potential and the formation of the maximum possible yield in the emerging conditions of cultivation (moisture).	Knowledge of the basics of soil science, agriculture, plant nutrition management and phytoanatomy safety of crops in the system of precision farming. The ability to model, analyze, define and solve technological and operational tasks for managing the production process of crops. Knowledge of the basic provisions of the system of agriculture and crop production, digital technologies in the management of the agricultural production process	Principles of plant nutrition management
M136-«Vehicle»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Principles of plant nutrition management	OUPR 5213	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Soil science and agricultural chemistry	1	3	Farming systems and crop production, GIS and remote sensing technologies, Technical support of technological processes in the system of precision farming, Theoretical foundations of the mechanization of agricultural production	Agricultural soil science, Physics and chemistry of soils, Physioanatomy monitoring of pests, Physioanatomy technologies of crops cultivation	The theory of plant nutrition, mechanisms and techniques for regulating plant nutrition. Soil properties in connection with plant nutrition and fertilizer application. Agrochemical characteristics of soils of the Republic of Kazakhstan. The concept of fertilizers, features of the application. Physico-chemical properties of fertilizers, their interaction with the soil. The utilization of nutrients from the soil and from fertilizers. Determination of fertilizer rates. Agrochemical soil survey. Compilation and design of electronic agrochemical cartograms. Using the results of agrochemical soil analysis for the calculation of fertilizer rates and mapping prescription in the technology of differentiated fertilizer application.	Knowledge of the basics of soil science, agriculture, plant nutrition management and phytoanatomy safety of crops in the system of precision farming. The ability to model, analyze, define and solve technological and operational tasks for managing the production process of crops. Knowledge of the basic provisions of the system of agriculture and crop production, digital technologies in the management of the agricultural production process	Optimization of mineral nutrition of crops
M136-«Vehicle»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Physioanatomy monitoring of pests	TMVO 6208	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Biology, Plant Protection and quarantine	2	1	Advanced biometeorology, GIS and remote sensing technologies, Technical support of technological processes in the system of precision farming, Theoretical foundations of the mechanization of agricultural production	Physioanatomy monitoring of agricultural crops and grounds on the farm to determine foci, area, the degree of its settlement (infection) by pests, diseases and weeds of plants, quarantine objects, the boundaries of their distribution in the territory of the Republic of Kazakhstan. Plan and schedule of phytoanatomy and quarantine measures to control pests of agricultural crops, quarantine objects, quarantine analysis and quarantine expertise of regulated products for compliance with the established requirements, work with regulatory documents in the field of plant protection and quarantine.	Knowledge of the basics of soil science, agriculture, plant nutrition management and phytoanatomy safety of crops in the system of precision farming. The ability to model, analyze, define and solve technological and operational tasks for managing the production process of crops. Ability to develop cartograms and prescription maps for technical means on the differential impact on the "soil-plant" system	Physioanatomy technologies of crops cultivation	
M136-«Vehicle»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Physioanatomy technologies of crops cultivation	FTVSK 6214	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Biology, Plant Protection and quarantine	2	1	GIS and remote sensing technologies, Technical support of technological processes in the system of precision farming, Theoretical foundations of the mechanization of agricultural production	Master student's research work, including implementation of master's thesis, Research practice	Current trends in the formation of phytoanatomy; systems and technologies for optimizing the phytoanatomy condition of agroecosystems. Assessment of the state of agroecosystems and the development of techniques and methods for their sustainable development. Phytoanatomy technologies of cultivation of major agricultural crops. Environmentally friendly crop protection systems for farm conditions. Physioanatomy diagnostics of agroecosystems. Definition of phytoanatomy problems of agroecosystems. Methods for determining the phytoanatomy status of soils. Phytoexamination methods of seeds.	Knowledge of the basics of soil science, agriculture, plant nutrition management and phytoanatomy safety of crops in the system of precision farming. The ability to model, analyze, define and solve technological and operational tasks for managing the production process of crops. Ability to develop cartograms and prescription maps for technical means on the differential impact on the "soil-plant" system	Physioanatomy monitoring of pests

M136 - «Vehicles»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Methodology of research work	MOD 6305	AS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Mechanization of technological processes	2	1	GIS and remote sensing technologies. Identifying research work. Implementing implementation of master's thesis. Technical support of technological processes in the system of precision farming. Theoretical foundations of the mechanization of agricultural production	Master student's research work, including implementation of master's thesis	The experimental technique is a ready-made algorithm for conducting scientific experiments with a specific description of the methodology, statistical processing of the experimental data, as well as the establishment of a specific choice of criteria or criteria for evaluation.	Skills of research and teaching activities, solving standard scientific problems and systematically updating their knowledge. The ability to model, analyze, define and solve technological and operational tasks for managing the production process of crops. The ability to model and analyze production issues, conduct research to improve technological and technical solutions for the implementation of precision farming system	Fundamentals of research and experiment planning
M136 - «Vehicles»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Fundamentals of research and experiment planning	ONPPE 6308	AS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Mechanization of technological processes	2	1	Farming systems and crop production, GIS and remote sensing technologies	Master student's research work, including implementation of master's thesis	The concept of creative thinking. Research work. Setting scientific tasks, the implementation of research results in the production or educational process. Own argumentation, expressing its position on the main issues of scientific research. Patenting, modeling of technological processes and the creation of new efficient machines for agriculture. Modern methods of planning experiments of technological processes to substantiate the main parameters and modes of operation of working bodies, mechanisms of agro-technological machines. Tasks, organization and stages of experimental research. Setting goals. Planning an experiment to obtain a mathematical model of the process. First order plans. Second order plans. Optimization of the objects of study. Methodical support of the experiment.	Skills of research and teaching activities, solving standard scientific problems and systematically updating their knowledge. The ability to model, analyze, define and solve technological and operational tasks for managing the production process of crops. The ability to model and analyze production issues, conduct research to improve technological and technical solutions for the implementation of precision farming system	Methodology of research work
M136 - «Vehicles»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Physics and chemistry of soils	FHP 6210	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Soil science and agricultural chemistry	2	1	Advanced biometeorology, Digital technology in Plant Growing, GIS and remote sensing technologies, Technical support of technological processes in the system of precision farming	Master student's research work, including implementation of master's thesis	Subject, purpose and objectives of the course "Physics and chemistry of soils". Granulometric and microaggregate composition of soils. Processes of soil structure formation. Specific and volume weight of soils. Soil air and research methods. The water and heat regimes of soil. Modern ideas about the water and heat regimes of soil. Modern ideas about geobovumit. Soil colloids. Absorption of cations by soil.	Knowledge of the basics of soil science, agriculture, plant nutrition management and phyto sanitary safety of crops in the precision farming system. The ability to compare, formulate conclusions, build their own arguments, to express their position on the main issues of precision farming. Ability to develop cartograms and prescription maps for technical means on the differential impact on the "soil-plant" system	Agricultural soil science
M136 - «Vehicles»	7M08701 - «Precision Farming»	Full-time (MS 2 years) trimester	Agricultural soil science	Agp 6215	BS	Elective subjects	5.0	Master's program by specialization (Scientific & pedagogical direction)	Soil science and agricultural chemistry	2	1	Advanced biometeorology, Digital technology in Plant Growing, GIS and remote sensing technologies, Technical support of technological processes in the system of precision farming	Master student's research work, including implementation of master's thesis	Soil processes occurring under the influence of human agro-technical measures and their influence on cultivated plants. Ways to create and maintain effective soil fertility and its conditions	Knowledge of the basics of soil science, agriculture, plant nutrition management and phyto sanitary safety of crops in the system of precision farming. The ability to compare, formulate conclusions, build their own arguments, to express their position on the main issues of precision farming. Knowledge of the basic provisions of the system of agriculture and crop production, digital technologies in the management of the agricultural production process	Physics and chemistry of soils

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