TITLE OF THE Curricula/Module

IT IN OPERATION OF AGRICULTURAL MACHINERY

NKSU /Kazakhstan

2021

AGR 72107 «IT in operation of agricultural machinery» 5 credits

Short Name of the University/Country code Date (Month / Year)	The Republic of Kazakhstan Sh.Ualikhanov Kokshetau State University
TITLE OF THE Curricula/Module EP "Agricultural machinery and technology"	AGR 72107

Teacher(s) Doctor PhD Kakabaev N.A.	Department Department of "Mechanization and Livestock"
Coordinating: Others:	Head of the Department Kakabaev N.A. Dean of the Faculty: A.Zh. Iskakov

Study cycle	Level of the module	Type of the module
BA	Bachelor	Elective

Form of delivery	Duration	Langage(s)
Full-time	15 weeks	Russian

Prerequisites	
Prerequisites:	**Co-requisites (if necessary):** Prerequisite discipline Agrotechnological machines
To know:	Basic principles, devices and operating modes of technical means. The main ways to regulate and use modern information systems. Analyze the results of practical work and measurements, evaluate their reliability and carry out mathematical processing.
Possess:	Own modern telecommunications equipment. Use global information resources to solve problems. To carry out field and laboratory studies of the state of individual natural components, natural, natural-anthropogenic and socio-economic complexes. Analyze and evaluate the collected data, solve research problems using the methods of complex system analysis. Formulate the correct conclusions from the results obtained and give recommendations for their practical application. Prepare reports on research work, prepare scientific reports and articles, messages, abstracts.

CTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
5	150	60	90

Aim of the module (course unit): competences foreseeen by the study programme

Students gaining a complex of knowledge about global navigation technologies, methods and means used in space and ground navigation to determine the parameters and coordinates of points on the physical surface and in the Earth's atmosphere using global satellite navigation systems (GSNS) GLONASS, GPS, GALILEO, etc. Effective use of various methods, IT systems in the operation of agricultural machinery and the use of satellite navigation technologies for management, control and accounting.

Learning outcomes of module (course unit)	Teaching/learning methods	Assessment methods
To know: To know the features of satellite navigation technologies based on the use of GSNS, to be well oriented in the technical, methodological, regulatory, mathematical and software support of modern satellite navigation technologies with the use of IT in agricultural machinery.	Lecture with submission of video materials, practical lesson, ISW, ISWT	Test control Oral survey Types of control: current, intermediate 1 and 2 control, final control.
To be able to: to use the acquired knowledge in solving issues of regulation of means of navigation; principles of navigation and features of the functioning of global satellite radio navigation systems (SRNS); generate navigation signals and information transmission to the GLONASS and GPS SRNS; device and principles of operation of satellite equipment, consumer sensors; the use of satellite technologies in the navigation of agricultural machinery.		
To have: to link the acquired knowledge and skills in practice when solving various problems of navigation in agricultural machinery.		

Themes	Contact work hours						Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practiacl work	Laboratory Placement works	Total contact	Individual work valuation	Tasks
The structure and role of using IT in agricultural production	2			2		3	7	The value and structure of IT development in agricultural production
Global navigation satellite systems (NAVSTAR, GLONASS, GALILEO, etc.)	2			2		3	7	Principles of operation of navigation signals and information transfer to the GLONASS and GPS SRNS
Information support of global navigation technologies with GPS system	2			2		3	7	Ground control complex and navigation equipment, standard and accurate positioning of satellite signals.
Information support of global navigation technologies with SRNS system.	2			2		3	7	Basic principles of operation and technical characteristics of modern GSNS.
Optimization of computer vision algorithms and real-time implementation	2			2		3	7	Pattern recognition techniques, image analysis and processing
Web technologies (Agro SDI, Geoportals, Geo-services, Geo-analytical systems)	2			2		3	7	Analysis and processing of spatial information at the local and global levels; (Earth remote sensing materials)
AMS Precision Agriculture	2			2		3	7	How it works is tracking, correcting and optimizing satellite signal reception. Documentation system, application for rate change and wireless data transfer.
AutoTrac parallel driving	2			2		3	7	Automated steering for various car brands.
System of intelligent control of agricultural machinery (iTEC Pro)	2			2		3	7	Intelligent Integrated Equipment Management (iTEC Pro) automatically performs headland turns to reduce skips and overlaps
SECTION CONTROL system	2			2		3	7	A system that supports the functions of section control, automatic control of individual sections of the working equipment in specified areas of the field
Yield sensors for precision agriculture	2			2		3	7	The monitoring system (mapping) of yield in precision farming, determines the result of the work of crop heterogeneity within the boundaries of each field using special sensors and controllers installed on combines, using

						displays for precision farming and GPS receivers, during the harvest
JDLink telematics solutions	2		2		3	7	Wireless technology and precision farming solutions and enables communication between machines, machine owners, operators and dealers and manage your fleet more efficiently
Work Sight unique remote diagnostics and programming features	2		2		3	7	Remote maintenance tools to get quality support, optimize machine performance and improve reliability.
Remote access to the display and control of agricultural machinery	2		2		3	7	Agricultural machinery control center for information exchange between operators and machines in the field
Automation control system for accounting of grain movement from the field to the elevator (ACS)	2		2		3	7	The system of automation and control of the current position of the machine for organizing and accounting for the movement of goods through the weight and balances in warehouses of agricultural enterprises
Total	**30**		**15**		**45**	**105**	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Running control 1	100	8 week	Oral survey
Running control 2	100	15 week	Oral survey
Final exam	100	16 week	Tickets orally

Compulsory literature/ Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
Antonovich K.M.	2006	The use of satellite radio navigation systems in geodesy		M .: Kartgeocenter; Novosibirsk: Science.
Truflyak E.V.	2016	The main elements of a precision farming system	631.171 (076.5)	Krasnodar KubSAU
Yatsenkov V.S.	2005.	Basics of satellite navigation systems GPS NAVSTAR and GLONASS		M .: Hotline - Telecom
Additional literature				
L.I. Kushnarev, S.L. Kushnarev, A.V.	2015	Organization of effective use of the machine and tractor fleet		FGNU "Rosinformtech".

Chepurin, E.L. Chepurina				
Iofinov S.A., Lyshko G.P.	1984	Operation of the machine and tractor fleet		2nd ed. revised and add. M., Kolos,
Genike A.A., Pobedinsky G.G.	1999	Global satellite positioning system GPS and its application in geodesy.		M .: "Kartotsentr" - "Geodezizdat"
Dr. *Jitka* Kumhálová / Prof. Kumhála František	2019	Soil physical properties and its measurement		Presentations

ANOTATION /course summery

The discipline "IT in the operation of agricultural equipment" studies global navigation satellite systems (NAVSTAR, GLONASS, GALILEO, etc.), technical support for global navigation technologies, optimization of computer vision algorithms and real-time implementation, Web technologies (Agro SDI, Geoportals , Geo-services, Geo-analytical systems), information support of global navigation technologies GPS system for precision farming, AMS system, AutoTrac parallel driving, iTEC Pro, SECTION CONTROL, telematics solutions JDLink, Work Sight unique functions of remote diagnostics and programming, yield sensors , remote access to the display and control of the operation of agricultural machinery, a control system for the automation of accounting for the movement of grain from the field to the elevator (ACS) with the use of information technology.

List of **themes and short description**

Themes	Contact work hours
The structure and role of using IT in agricultural production	**10**
Global navigation satellite systems (NAVSTAR, GLONASS, GALILEO, etc.)	**10**
Information support of global navigation technologies with GPS system	**10**
Information support of global navigation technologies with SRNS system.	**10**
Optimization of computer vision algorithms and real-time implementation	**10**
Web technologies (Agro SDI, Geoportals, Geo-services, Geo-analytical systems)	**10**
AMS Precision Agriculture	**10**
AutoTrac parallel driving	**10**
System of intelligent control of agricultural machinery (iTEC Pro)	**10**
SECTION CONTROL system	**10**
Yield sensors for precision agriculture	**10**
JDLink telematics solutions	**10**
Work Sight unique remote diagnostics and programming features	**10**
Remote access to the display and control of agricultural machinery	**10**
Automation control system for accounting of grain movement from the field to the elevator (ACS)	**10**
Total	**150**