TITLE OF THE Curricula/Module

PHYSICAL PROPERTIES OF SOIL AND THEIR MEASUREMENT

NKSU /Kazakhstan

2021

AGR62156 «Physical properties of soil and their measurement», 5 credits

Short Name of the University/Country code Date (Month / Year)	**Republic of Kazakhstan Sh.Ualikhanov Kokshetau State University**
TITLE OF THE Curricula/Module EP "Agronomy"	AGR62156

Teacher(s) D. a / c s. Auzhanova M.A.	**Department Department of plant growing and soil science**
Coordinating:	Head of the Department: Suraganov M.N.
Others:	Dean of the Faculty: Iskakov A.Zh.

Study cycle	**Level of the module**	**Type of the module**
BA	Bachelor	Module 7

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

Prerequisites	
Prerequisites:	**Co-requisites (if necessary):** Prerequisite discipline "Soil Science"
To know:	Modern concepts of soil, soil terminology, the laws of soil formation and the formation of soil fertility.
Possess:	Possess the theoretical foundations of biology, crop production Have an idea of the composition and properties, classification by soil origin; the main methods for assessing soil fertility

CTS (Credits of the module)	**Total student workload hours**	**Contact hours**	**Individual work hours**
5	150	45	105

Aim of the module (course unit): competences foreseeen by the study programme		
Basic physical properties of soils and their change depending on natural factors and anthropogenic influences; basic principles and methods of studying the physical properties and regimes of soils; the main ways of regulating the physical state of soils; physical condition of soils depending on the types of impacts. The use of various methods for assessing soil physical parameters by methods of use in plant growing with the use of intelligent technologies based on GIS, Earth remote sensing data, Global Navigation Satellite Systems, Web, Big Data, etc.		
Learning outcomes of module (course unit)	**Teaching/learning methods**	**Assessment methods**
To know: The composition and physical properties of soils and their measurements are important for fertility;	Lecture with submission of video materials, presentations, practical lesson, SIWT, SIW.	Current control: Tests Oral survey Control types: Mid-term control 1

To explain : the main physical properties of soils and their change depending on natural factors and anthropogenic influences;		Mid-term control2 Exam: orally
To numerate: basic principles and methods of studying the physical properties and regimes of soils;		
To recognize: types of soil water, types of soil water regimes and ways to optimize them; to link the fertility of a particular soil with its physical properties and regimes; the method of studying physical properties; principles and methods of studying the physical properties and regimes of soils;		
To give examplesof: Professional methods of preparation and analysis of laboratory soil studies, generalization of research results at the modern level.		
To describe: the main ways of regulating the physical state of soils; use modern information systems. Analyze the information received and the results of soil cover studies.		
To be able to: To be able to: use the knowledge gained in solving issues of regulating the water-physical state of soils, making ecologically sound decisions;		
Possess:: Collect and interpret significant data on the fertility of a particular soil with its physical properties and modes;		
to build: The processes of structure formation, its loss and what are the processes and methods of restoring the structure of soils.		
to develop: agronomic methods of regulation of soil regimes of soils.		
to evaluat: to evaluate the quality and effectiveness of methods for regulating the physical properties and regimes of soils.		

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practiacl work	Laboratory work	Placements	**Total contact work**	**Individual workиндив**	**Tasks**
Soil structure and its role in agricultural production	2			1			**3**	**7**	The importance of structure in the formation of soil fertility
Characteristics of the structure of the soil	2			1			**3**	**7**	Factors, conditions and mechanism for the formation of an agronomically valuable structure
Granulometric composition of soil	2			1			**3**	**7**	The role of granulometric composition in soil formation and soil fertility
Physical properties of soil - soil density	2			1			**3**	**7**	Methods for determining and assessing the structural state of the soil
Physical properties of soil - porosity (duty cycle) of the soil	2			1			**3**	**7**	Soil compaction forecast. Swelling and shrinkage of soils
Physical properties of the soil - plasticity and stickiness of the soil, swelling, shrinkage and soil cohesion	2			1			**3**	**7**	Specific soil surface. Soil resistance to compression and wedging
Absorption capacity of soils, soil solution, composition, properties	2			1			**3**	**7**	Absorption capacity and composition of exchange-absorbed cations in different soil types
Techniques for measuring physical properties. The main indicators of the soil profile.	2			1			**3**	**7**	The concept of the degree of cultivation and indicators of soil cultivation
Deformation properties of soils	2			1			**3**	**7**	To study the theoretical foundations of erosion-accumulative processes, aspects of soil protection from erosion and deflation

Soil organic matter, composition, properties	2			1			**3**	**7**	The process of humification and the formation of humic acids
Physical properties of soil: measurement of cone index and moisture content in soil	2			1			**3**	**7**	Categories and forms of soil moisture. Assessment of moisture content, water permeability, water-lifting capacity in different types of soils
Soil infiltration parameters.	2			1			**3**	**7**	Factors influencing infiltration
Remote sensing methods of the earth.	2			1			**3**	**7**	Compilation of soil maps
Analysis of the qualitative state of the agricultural land fund, distribution by land categories.	2			1			**3**	**7**	The current state of soils and land resources of the Republic of Kazakhstan
Experimental devices for on-line registration of soil properties.	2			1			**3**	**7**	Using the latest technology
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**
A. Zh. Akbasov, G. A. Sainova, A. D. Akbasova.	2019	Soil science	**40.3** **A 38** ISBN: 5446874994 ISBN-13(EAN): 9785446874996	Publisher: Academy
Mukha V.D. N.I. Kartamyshev	2003	Agrosoil Science		Publisher: Kolos

Mazirov M.A. and oth.	2012	Field studies of soil properties	ISBN 978-5-9984-0192-3	VSU, Vladimir
Truflyak E.V.	2016	The main elements of a precision agriculture system	631.171 (076.5)	Krasnodar KubSAU
Additional literature				
Faizov K.Sh., Urazaliev R.A., Iorgansky A.I.,	2001.	Soils of the Republic of Kazakhstan		Almaty: LLP "Aleiron",
Khabarov A.V.,	2001	"Soil Science with the Basics of Geology".		Moscow
Gerasimova M.I., Gavrilova I.P., Bogdanova M.D .:	2010	Small-scale soil mapping		Publishing house Mosk. un-ty
Dr. *Jitka* Kumhálová / Prof. Kumhála František	2019	Soil physical properties and its measurement		Presentations
Julieta Arnaudova. Prof. Krum Hristov, Prof. Klaus Briess, Remote Sensing Course Material	2019	"Basics of precision agriculture "		Presentations

ANOTATION /course summery

The discipline "Physical properties of soil and their measurement" studies information about the most important physical properties of soil and its relationship is given along with the principles of its measurement. Various methods of soil compaction, Soil indicators of moisture or soil infiltration rate are studied. With traditional application technology, more fertile areas, receiving the same dose of nutrients as less fertile ones, accumulate nitrogen and phosphorus in the soil, while less fertile areas consume soil nutrients. Thus, some areas of the field become more and more fertile, while others are constantly depleted.

List of **themes and short description**

Themes	Contact work hours
Soil structure and its role in agricultural production	**10**
Characteristics of the structure of the soil	**10**
Granulometric composition of soil	**10**
Physical properties of soil - soil density	**10**
Physical properties of soil - porosity (duty cycle) of the soil	**10**
Physical properties of the soil - plasticity and stickiness of the soil, swelling, shrinkage and soil cohesion	**10**
Absorption capacity of soils, soil solution, composition, properties	**10**
Techniques for measuring physical properties. The main indicators of the soil profile.	**10**

Deformation properties of soils	**10**
Soil organic matter, composition, properties	**10**
Physical properties of soil: measurement of cone index and moisture content in soil	**10**
Soil infiltration parameters.	**10**
Remote sensing methods of the earth.	**10**
Analysis of the qualitative state of the agricultural land fund, distribution by land categories.	**10**
Experimental devices for on-line registration of soil properties.	**10**
Total	**150**