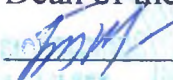


**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES  
OF UKRAINE**

Department of Agriculture and Herbiology

**«CONFIRMED»**

Dean of the Faculty

  
Tonkha O. L.

\_\_\_\_\_ 2023

**«APPROVED»**

at the meeting of the Department of  
Agriculture and Herbiology

Protocol № 07 dated 06.04.2023

Head of Department

  
Tanchyk S. P.

**«REVIEWED»**

Program Coordinator

  
Tonkha O. L.

**PROGRAM OF THE COURSE**

**«AGRICULTURE»**

Specialization 201 «Agronomy»

Educational program «Agronomy»

Faculty «Agrobiological»

Developers:

Tanchyk S. P. – head of the Department of Agriculture and Herbiology, doctor in agriculture, professor

Pavlov O. S. – docent of the Department of Agriculture and Herbiology, PHD in agriculture, docent

Litvinov D. V. – professor of the Department of Agriculture and Herbiology, doctor in agriculture, professor

**Kyiv – 2023**

## 1. Description of the course «Agriculture»

<b>Field of knowledge, specialization, educational program, educational degree</b>		
Educational degree	Bachelor's	
Specialization	201 «Agronomy»	
Educational program	Agronomy	
<b>Characteristics of the course</b>		
Type	Compulsory	
Total number of hours	195	
Number of ECTS credits	6,5	
Number of content modules	4	
Course project (work)	Course (work)	
Form of assessment	Exam	
<b>Indicators of the course for full-time and part-time forms of study</b>		
	Full-time form of study	Part-time form of study
Course (year of study)	2	2, 3
Semester	3, 4	3, 4, 5
Lecture classes	60 hr.	34 hr.
Laboratory classes	60 hr.	34 hr.
Self-study	75 hr.	-
Number of weekly classroom hours for the full-time form of study:	4 hr.	-

## **2. Purpose, objectives, and competencies of the course**

The main purpose of agriculture is the efficient use of land, preservation, and improvement of soil fertility, obtaining a stable, energetically, and economically feasible yield of agricultural crops from a unit of area. **The main purpose** of this course is to help the future generation to improve soil fertility, agricultural productivity and yield and minimize crop losses. By considering agriculture as an applied science, students gain an understanding of factors affecting plant growth, soil fertility indicators, laws of agriculture, scientifically based crop rotations, measures, methods, and systems of soil cultivation, agrotechnical requirements of agricultural crops before sowing, crop care measures, and anti-erosion measures.

### **Objectives** of the course:

1. To study the importance in plant life of the main factors of the ecological environment and the laws of agriculture and their use in agricultural production.
2. To study the concept of soil fertility and its main indicators. Master the practical measures of regulation of water, air, heat, light, and nutrient regimes of soil.
3. To study the scientific bases of crop rotations and to master the methods of their design, implementation, and development.
4. To study the scientific bases of soil tillage, methods of developing a system of tillage and quality control of major field work.
5. To study modern machines and tools that are used for basic field work.
6. To study the scientific bases and agronomic measures to protect soils from erosion.

### **Acquisition of competencies:**

#### **Integrated competency (IC):**

- The ability to solve complex specialized tasks and practical problems in agronomy, which involves the application of theories and methods of the relevant science and is characterized by complexity and compliance with zonal conditions.

#### **General competencies (GC):**

- Knowledge and understanding of the subject area and understanding of professional activity.

#### **Professional (special) competencies (PC):**

- Basic knowledge of the main modules of agrarian science in agriculture.
- The Ability to manage complex actions or projects, responsibility for decision-making in specific production conditions.
- The ability to manage the factors affecting plant growth with different resource filling and changes in the ecological environment, which allows obtaining the highest quantity and quality of grown products from a unit of area with the lowest resource costs.

#### **Program learning outcomes (PLO):**

- To demonstrate knowledge and understanding of fundamental disciplines to the extent necessary to possess relevant skills in the field of agronomy.
- To analyze and integrate knowledge from general and special professional training to the extent necessary for specialized professional work in the field of agronomy.

- To design and organize activities for the cultivation of high-quality agricultural products in accordance with current requirements.
- To Integrate and improve production processes of growing agricultural products in accordance with current requirements.
- To plan economically profitable production of agricultural products.

### 3. Program and structure of the course for

- complete full-time (part-time) form of study;
- shortened full-time (part-time) form of study.

Names of content modules and topics	Number of hours										
	weeks	Full-time form					Part-time form				
		total	including				total	including			
			1	lab	ind	self		1	lab	ind	self
1	2	3	4	5	6	7	8	9	10	11	12
<b>Content Module one. Scientific bases of agriculture</b>											
Topic 1. Agriculture – food, energy, and environmental safety of Ukraine	1	7	2	-	-	5	2	2	-	-	-
Topic 2. Scientific bases of agriculture.	2–4	11	6	-	-	5	2	2	-	-	-
Topic 3. Factors affecting plant growth and laws of agriculture	5–7	30	6	14	-	10	6	2	4	-	-
Topic 4. Living conditions of agricultural plants and methods of their regulation	8–10	30	6	14	-	10	6	2	4	-	-
Total for content module one	10	78	20	28	-	30	16	8	8	-	-
<b>Content Module two. Scientific bases of crop rotations</b>											
Topic 1. Scientific bases of crop rotations	11–12	9	4		-	5	2	2	-	-	-
Topic 2. Placement of major field crops and fallow field in crop rotation	13–15	33	6	17	-	10	8	4	4	-	-
Total for content module two	5	42	10	17	-	15	10	6	4	-	-

1	2	3	4	5	6	7	8	9	10	11	12
Content Module three. Design, introduction, and development of crop rotations											
Topic 1. Classification of crop rotations	1	2	2	-	-	-	2	2	-	-	-
Topic 2. Design, introduction, and development of crop rotations	2	10	2	3	-	5	10	2	8	-	-
Total for content module three	2	12	4	3	-	5	12	4	8	-	-
Content Module four. Soil tillage. Basics of farming systems											
Topic 1. Theoretical foundations of tillage	3	2	2	-	-	-	2	2	-	-	-
Topic 2. Technological operations (processes) in tillage	4	2	2	-	-	-	2	2	-	-	-
Topic 3. Measures (techniques) of tillage	5	2	2	-	-	-	2	2	-	-	-
Topic 4. Tillage systems	6	2	2	-	-	-	2	2	-	-	-
Topic 5. The system of primary tillage	7–8	13	4	4	-	5	6	2	4	-	-
Topic 6. The system of pre-sowing tillage for spring crops	9–10	13	4	4	-	5	6	2	4	-	-
Topic 7. The system of post-sowing tillage	11–12	13	4	4	-	5	6	2	4	-	-
Topic 8. Minimization of tillage	13	7	2	-	-	5	2	2	-	-	-
Topic 9. Conservation tillage	14	7	2	-	-	5	-	-	-	-	-
Topic 10. Concepts of agricultural systems, their development and current state	15	2	2	-	-	-	-	-	-	-	-
Total for content module four	13	63	26	12	-	25	30	16	12	-	-
Course project (work) on the topic: "Agroeconomic substantiation and design of the crop rotation system on the farm"	-	1				1				1	
Total hours	30	195	60	60	1	75	68	34	34	1	

#### 4. Laboratory class topics

№	Topics title	Number of hours
1	Determination the structure of the treated soil layer by the method of saturation in cylinders. Determination of bulk density of soil.	4
2	Determination of soil penetration resistance	4
3	Determination of soil viscosity by the method of MO Kaczynski	4
4	Determination of soil plasticity, particle size distribution and soil consistency by the Atterberg method	4
5	Determination of soil aggregation according to Savvinov (dry sieving) and water-stable aggregates (wet sieving)	4
6	Determination of soil moisture, total moisture supply and its productive part	4
7	Determination of soil water permeability	4
8	Methods of crop rotation design. Drawing up a crop rotation scheme	5
9	Characteristics of the Polissya zone. Polissya crop rotations.	4
10	Characteristics of the Forest-Steppe zone. Forest-steppe crop rotations.	4
11	Characteristics of the Steppe zone. Steppe crop rotations.	4
12	Drawing up a plan for the development of crop rotations	3
13	Development of a system of primary tillage in crop rotation	4
14	Development of a system of pre-sowing tillage in crop rotation	4
15	Development of a system of post-sowing tillage in crop rotation	4

#### 5. Self-Study class topics

№	Topics title	Number of hours
1	The Origins of Agriculture	5
2	Use of agricultural laws in modern agriculture	10
3	Methods of determining air and thermal properties of soil	10
4	Contribution of Ukrainian and foreign scientists to the development of crop rotation	10
5	Characteristics of soil and climatic zones of Ukraine	10
6	Special soil-protecting crop rotations and crop rotations on irrigated and drained lands	6
7	Quality control of the primary tillage	4
8	Quality control of the pre-sowing tillage	4
9	Quality control of the post-sowing tillage	4
10	Soil erosion accounting methods	4
11	Conservation tillage	4

#### 6. Samples of control questions, tests for assessing the level of knowledge acquisition by students

##### Questions list:

1. Soil fertility, types of fertility and its indicators.
2. The concept of crop rotation and its significance.
3. Air properties of soil and methods of their regulation.
4. Thermal properties of soil and methods of their regulation.
5. Placement of spring cereals in crop rotation.

6. Water properties of soil and methods of their regulation.
7. The ratio of agricultural crops before re-sowing. The phenomenon of soil fatigue and the causes of its occurrence
8. Fallow field and its varieties. The task of fallow field and its disadvantages.
9. Factors affecting plant growth.
10. Classification of crop rotations. Types of crop rotations.
11. Light regime and methods of its regulation.
12. Nutritional regime of soil and methods of its regulation.
13. Preceding crops of winter wheat, their characteristics.
14. Laws of agriculture and their meaning.
15. Chemical causes of crop rotations.
16. Physical causes of crop rotations.
17. Biological causes of crop rotations.

### Tests:

#### Question 1

<b>Indicate the agronomic measures to regulate the light regime</b>
1. The direction of the lines of culture in the field
2. Irrigation and drainage
3. Protect crops from weeds
4. Application of organic and mineral fertilizers
5. Optimal plant density per unit area

#### Question 2

<b>Select the dimensions of soil aggregates that belong to the microstructure, mm</b>
1. 1,00–3,00
2. 0,5–1,00
3. <0,25
4. 0,25–0,50
5. >10,00

#### Question 3

<b>What is the process of air exchange between soil and atmosphere and what factors affect it?</b>	
1. Diffusion	A. Temperature
2. Convection	C. Precipitation
3. Air permeability	S. Crops
4. Aeration	D. Wind
5. Air capacity	E. The duration of the growing season

#### Question 4

<b>Select agrophysical soil fertility indicators</b>
1. The structure of the arable layer, the total porosity of the soil
2. Soil bulk density
3. The content of physical sand and physical clay
4. Stocks of productive moisture

5. The content of organic matter in the soil

### Question 5

Give a brief definition of the law of autotrophic

### Question 6

Determine the reserve of productive moisture (P) (in mm) in the soil layer (h) 0.5 m, if it is known that the soil moisture (W) is 17 %, the average bulk density in this layer (d) is 1.24 g/cm<sup>3</sup>, maximum soil hygroscopicity (Mg) – 3.5 %.

### Question 7

Choose the chemical causes of crop rotation

1. Reduction of weed infestation
2. Improving the nutrient regime of the soil
3. Increasing the reserves of productive moisture in the soil
4. Plants make better use of nutrients in crop rotation
5. Crop rotation plants make better use of nutrients from hard-to-reach compounds

### Question 8

What determines the structure of sown areas?

1. The presence of land
2. Market conditions
3. Specializations of the enterprise
4. Introduction of proper soil tillage
5. Soil and climatic conditions

### Question 9

Select crop rotation links in which winter wheat will have the maximum yield with the same cultivation technologies and for which zones they are typical

- |   |                  |
|---|------------------|
| 1. Corn for grain, peas, winter wheat         | A. Polissya      |
| 2. Sunflower, Fallow field, winter wheat      | B. Forest-steppe |
| 3. Soybeans, sunflowers, winter wheat         |                  |
| 4. Winter rye, late potatoes, winter wheat    | S. Step          |
| 5. Sugar beets, corn for silage, winter wheat |                  |

### Question 10

The place of culture in crop rotation depends on:

1. Economic importance
2. Phytosanitary condition
3. The presence of machine-tractor units
4. Biology of culture
5. Technologies for growing crops



## 7. Teaching methods

Methods of organization and implementation of educational and cognitive activities of students used in the study of the course "Agriculture":

- in terms of transmission and perception of educational information: verbal (lectures); visual (illustration, demonstration).
- in terms of logic and thinking explanatory-illustrative (presentation), reproductive (short tests).
- in terms of learning management: educational work under the guidance of a teacher, independent work of students.
- in terms of teamwork: methods of stimulation (additional points for essays and presentations).
- in the aspect of independent activity: educational module, structural-logical schemes, sample tests.

## 8. Forms of assessment

- current control of knowledge through surveys, writing tests of individual works during classes.
- modular control of knowledge by oral delivery of the passed material of the corresponding module.
- final control of knowledge by performing course work, exam.

## 9. Distribution of grades received by students

Evaluation of student knowledge is carried out on a 100-point scale and is converted to national grades according to Table "Regulations and Examinations and Credits at NULES of Ukraine" (order of implementation dated 26.04.2023, protocol № 10)

Student rating, points	National grade based on exam results	
	Exams	Credits
90-100	Excellent	Passed
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactory	Not passed

In order to determine the rating of a student (listener) in the discipline  $R_{dis}$  (up to 100 points), the rating from the exam  $R_{ex}$  (up to 30 points) is added to the rating of a student's academic work  $R_{aw}$  (up to 70 points):  $R_{dis} = R_{aw} + R_{ex}$ .

## 10. Educational and methodological support

Scientific and methodological support of the educational process includes state standards, curricula, textbooks, and manuals; electronic presentations, videos,

instructional materials of laboratory classes; individual educational and research tasks; control works; text and electronic versions of tests for current and final control, methodical materials for the organization of independent work of students.

## **11. Recommended sources of information**

### **Basic:**

1. Землеробство. Навчальний посібник / Танчик С. П. та ін. Київ. : ЦП «Компринт», 2022. 350 с.
2. Центи́ло Л. В., Танчик С. П., Цюк О. А. Управління родючістю ґрунту за зберігаючого землеробства. Вінниця «Твори», 2021. 361 с.
3. Танчик С. П., Рожко В. М., Карпенко О. Ю. Землеробство з основами ґрунтознавства. Навчальний посібник. Київ. 2021. 442 с.
4. Танчик С. П., Прима́к І. Д., Літвіно́в Д. В., Центи́ло Л. В. Сівозміни: підручник. 2019. 364 с.
5. Танчик С. П., Цюк О. А., Центи́ло Л. В. Наукові основи систем землеробства. Монографія. Вінниця: ТОВ «Нілан ЛТД», 2015. 314 с.
6. Гудзь В. П., Прима́к І. Д., Танчик С. П. Землеробство. К.: Центр учбової літератури, 2014. 432 с.
7. Прима́к І. Д., Манько Ю. П. та ін. Екологічні проблеми землеробства. К.: Центр учбової літератури, 2010, 455 с.
8. Косолап М. П., Кротіно́в О. П. Система землеробства no-till. К.: Логос, 2011. 352 с.

### **Auxiliary:**

1. Камі́нський В. Ф., Літвіно́в Д. В., Шилі́на Л. І. Агробіологічні основи короткоротаційних сівозмін Лісостепу. Монографія, 2019. 228 с.
2. Шува́р І. А., Рої́к М. В., Івани́шин В. В., Сендецький В. М., Центи́ло Л. В. Сидерація в технологіях сучасного землеробства: монографія. Івано-Франківськ : Симфонія форте, 2016. 180 с.
3. Прима́к І. Д., Косолап М. П., Войтович М. В. та ін. Механічний обробіток ґрунту: історія, теорія, практика. Навчальний посібник. Вінниця. ТОВ «Твори», 2019. 425 с.
4. Циліу́рик О. І. Система мульчувального обробітку ґрунту в сівозмінах Північного Степу. Монографія. Дніпро: Новий Світ, 2019. 297 с.
5. Шевченко М. В. Наукові основи систем обробітку ґрунту в умовах нестійкого та недостатнього зволоження. Монографія. Харків, 2019. 209 с.
6. Танчик С. П. No-till і не тільки. Сучасні системи землеробства. Навчальний посібник. К. : Юнівест Медіа, 2009. 159 с.
7. Землеробство. Терміни та визначення понять : ДСТУ 4691:2006. – [Чинний від 2006-12-11]. К. : Держспоживстандарт України, 2008. 37 с. – (Національний стандарт України).

### **Information resources**

1. Державна служба статистики України [Електронний ресурс] – Режим доступу до ресурсу: <http://www.ukrstat.gov.ua/>.
2. worldometers [Електронний ресурс] – Режим доступу до ресурсу: <https://www.worldometers.info/uk/>.

3. Інтернет-бібліотека Організації економічного співробітництва та розвитку (ОЕСР) [Електронний ресурс] – Режим доступу до ресурсу: [https://www.oecd-ilibrary.org/agriculture-and-food/data/oecd-agriculture-statistics\\_agr-data-en](https://www.oecd-ilibrary.org/agriculture-and-food/data/oecd-agriculture-statistics_agr-data-en).

4. Продовольча та сільськогосподарська організація Об'єднаних націй (ФАО) [Електронний ресурс] – Режим доступу до ресурсу: <http://www.fao.org/countryprofiles/index/ru/?iso3=UKR>.