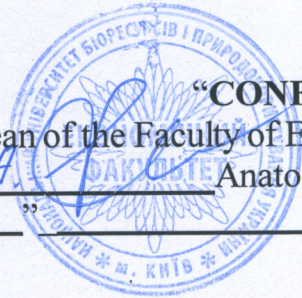


**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF
UKRAINE**

Department of Storage, Processing and Standardization
of Plant Products after prof. B.V. Lesik

“CONFIRMED”
Dean of the Faculty of Economics
Anatolii Dibrova
“ ” 2023p.



“APPROVED”
at the meeting of the department of Storage,
Processing and Standardization of Plant Products
Protocol №4 dated “25” 04 2023 p.
Head of Department
Hryhorii Podpriatov

”REVIEWED”
Program Coordinator EP “«Entrepreneurship,
Trade and Exchange activities»”
Program Coordinator EP
Valentina Yavorska

PROGRAM OF THE COURSE
“Technology production of crop and livestock products”

Specialization 076 Entrepreneurship and Trade
Educational program «Entrepreneurship, Trade and Exchange activities»
Faculty (Institute) Economics
Developers: Sergiy Gunko, PhD, associate professor
(position, academic degree, academic title)

Kyiv – 2023

1. Description of the course

"Technology production of crop and livestock products"

Field of knowledge, specialization, educational program, educational degree		
Educational degree	<i>Bachelor's</i>	
Specialization	<i>076 Entrepreneurship and Trade</i>	
Educational program	<i>«Entrepreneurship, Trade and Exchange activities»</i>	
Characteristics of the course		
Type	Compulsory	
Total number of hours	90	
Number of ECTS credits	3.0	
Number of content modules	2	
Course project (work) (if applicable)	–	
Form of assessment	<i>Exam</i>	
Indicators of the course for full-time and part-time forms of study		
	Full-time form of study	Part-time form of study
Course (year of study)	1	
Semester	1	
Lecture classes	<i>15 hr.</i>	
Practical, seminar classes	<i>15 hr.</i>	
Laboratory classes	<i>- hr.</i>	
Self-study	<i>60 hr.</i>	
Individual assignments	<i>– hr.</i>	
Number of weekly classroom hours for the full-time form of study	<i>2 hr.</i>	

2. Purpose, objectives, and competencies of the course

The purpose of the educational discipline is the formation of technological training for the production of plant and livestock products in future specialists and the formation of students' knowledge of the basics of technology, storage and processing of crop and livestock products on the basis of agrarian entrepreneurship.

The main *tasks* of this discipline are:

- study of the requirements of the state regulation of the quality of plant and livestock products;
- mastering the methods of quality control of plant and livestock products and comparing the actual quality indicators with the planned ones;
- the development of modern technologies for the production of plant and animal products, which ensure a high yield of marketable products that meet the requirements of state regulation.

As a result of studying the academic discipline, the student *should know*:

- technologies, ways and methods of preserving the natural environment;
- peculiarities of conducting safe activities of business, trade and exchange structures;
- foundations of ethical, cultural, scientific values and achievements of society;
- peculiarities of agricultural production organization;
- methods and ways of selling agricultural products;
- effective technologies in crop and animal husbandry.

be able:

- apply the acquired knowledge and skills to initiate and implement measures in the field of environmental protection;
- carry out safe activities of business, trade and exchange structures;
- demonstrate the ability to act socially and responsibly on the basis of ethical, cultural, scientific values and achievements of society;
- apply knowledge and skills to ensure the organization of agricultural production and sale of agricultural products;
- effectively use technologies in plant and animal husbandry.

Competencies of the educational programme:

Integrative competency (IC): Ability to solve complex specialized tasks and problems in the fields of entrepreneurial, trade, and exchange activities, or in the process of learning, which involves the application of theories and methods of organization and functioning of entrepreneurial, trade, and exchange structures and is characterized by complexity and uncertainty of conditions.

General competencies (GC): GC 9. A commitment to preserving the environment. GC 12. The ability to preserve and advance the moral, cultural, and scientific values and achievements of society based on an understanding of the history and patterns of development in the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and techniques, and the use of various types and forms of physical activity for active leisure and healthy living.

Professional (special) competencies (PC): PC 11. Ability to organize entrepreneurial and trade activities in the agricultural sector under the conditions of utilizing innovative approaches and international trade in agribusiness.

Program learning outcomes (PLO) of the educational programme: PLO 8. Apply acquired knowledge and skills to initiate and implement measures in the field of environmental conservation and safe activities of entrepreneurial, trade, and exchange structures. PLO 10. Demonstrate the ability to act socially responsibly based on ethical, cultural, scientific values, and achievements of society. PLO 21. Apply knowledge and skills to ensure the organization of agricultural production and the implementation of agricultural products under the conditions of using effective technologies in crop and livestock farming.

The curriculum for the preparation of bachelors in the specialty 076 "Entrepreneurship and trade" has allocated 90 hours, including 30 hours of classroom classes, to the study of the discipline "Technology production of crop and livestock products".

The final form of control is an exam. This discipline has been developed and certified by ENC Course page in eLearn: <https://elearn.nubip.edu.ua/course/view.php?id=973>

3. Program and structure of the course for:

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

3.1. Program of the course.

Module 1. Basis of crop production.

Lecture 1. Winter grain crops (winter wheat, winter barley, winter rye).

Winter grain crops of high potential biological capabilities. Experience of advanced farms in growing winter crops using intensive technology. Biological features and requirements of winter crops for life factors. Stages of organogenesis, growth phases and their accounting during the development of intensive technology. The best zoned and promising varieties that meet the requirements of intensive technology.

Placement of winter crops according to the best predecessors. The role of clean steam in increasing the production of quality wheat grain in arid conditions. Soil protection from water and wind erosion. Terms, methods and high quality of the main tillage depending on the predecessor and soil condition. Terms and methods of wet-providing pre-sowing tillage of the soil.

Effectiveness of organic and mineral fertilizers in different zones of growing winter crops. Determination of fertilizer application rates for the planned harvest. Layer-band method of applying mineral fertilizers. Theoretical justification of retail application of nitrogen fertilizers. Doses and periods of application of mineral fertilizers.

Selection of optimal terms and methods of sowing. Choosing the optimal width of the technological track. Sowing rate and seed sowing depth, taking into account zonal and varietal characteristics. Seed quality requirements. Seed treatment with systemic fungicides. Seed inlay. Treatment of seeds with retardants.

Measures to protect winter crops from winter and spring death. Fight against lodging with the help of growth regulators. The use of effective in the system of integrated protection of winter crops against weeds, diseases and pests. Machines and tools intended for crop care. Harvesting. Peculiarities of collecting short-stemmed varieties, fallen wet breads.

Separate and direct combining. Economic efficiency of intensive technologies of growing winter crops.

Lecture 2. Early spring grain crops (spring wheat, spring barley, spring oats).

Features of varietal agricultural technology of early spring grain crops. Cultivation under irrigation. Best practice and economic efficiency. Intensive spring wheat cultivation technology. Fodder and brewing barley and its requirements. Measures aimed at improving the quality of barley grain. Features of varietal agricultural technology in different zones. Placement of crops and oat agricultural technology. Collection features.

Lecture 3. Corn.

Corn is a highly productive food and grain crop. Potential opportunities in different soil and climate zones. Agrotechnical significance. Features of growth and development. Requirements for plant life factors. Morphological features of new and promising hybrids and their compliance with intensive technology.

Predecessors and placement in crop rotation. Unchanging crops. Their advantages and disadvantages. Basic tillage and its role in weed control. Requirements for the quality of soil cultivation. Hulling, plowing. Semi-partial cultivation of the soil, its value on insufficiently cultivated grants, flat different cultivation.

Calculation of fertilizer rates for the planned harvest. Organic and mineral fertilizers. The ratio of the main, pre-sowing fertilizer and top dressings. Application of herbicides. Spring harrowing and soil

leveling. Pre-sowing soil cultivation. Norms, methods, depth of application of herbicides under pre-sowing cultivation.

Dotted method of sowing. Optimal plant density depending on zonal conditions, growing season, hybrid, etc. Sowing density and plant nutrition level. Seed quality, sowing rates. Determination of the sowing rate. Crop care. The use of ring-spur rollers to destroy the crust, pre-emergence and post-emergence harrowing of crops, inter-row cultivation.

Terms and methods of collection. Application of corn harvesters and grain harvesters with a device for harvesting grain. Technology of collecting wet grain. Features of intensive technology in different zones. Features of growing under irrigation. Economic efficiency.

Millet is one of the main cereal crops. Intensive growing technology and economic efficiency.

Lecture 4. Millet.

Millet is one of the main cereal crops. Intensive growing technology and economic efficiency.

Module 2. Grain processing and storage technologies

Lecture 4. Theoretical aspects of processing and storage of plant products

General principles of storage and preservation of plant products. The main purpose of storage and processing of plant products as a science is the development of theoretical and practical bases of modes and methods of storage and processing of products.

Lecture 5. Grain mass as a storage object

Composition of grain mass and its physical properties. Physiological processes occurring in grain masses during storage. Grain. Admixtures - grain and garbage. Microorganisms. Pests of bread cereals. Air. Flowability, self-sorting, sparability. Sorptive properties of grain mass.

Respiration, germination and post-harvest ripening of grain. Life activity of microorganisms, insects and mites. Self-heating of grain masses. Durability of grain and seeds.

Lecture 6. Post-harvest processing of grain

Ways of increasing the stability of grain masses during storage. Post-harvest processing of grain masses. Characteristics of the main complexes for carrying out post-harvest processing of grain masses. Methods of grain cleaning. Active ventilation of grain masses, the meaning of this method and conditions. Types of installations and modes of active ventilation. Methods and regimes of grain drying. The main types of grain dryers. Economic efficiency of different methods of post-harvest processing.

Lecture 7. Grain storage. Types of granaries

Theoretical bases of grain storage regime in a dry state, in a cooled state, storage of raw corn grain without access to air, chemical preservation of grain. Economic efficiency of different regimes and methods of storage of grain masses.

Characteristics of modern types of granaries used in farms, feed mills, grain receiving points and other agro-industrial enterprises. Preparation of granaries for receiving grain. Quality control and monitoring of stored grain. Norms of natural losses of grain during storage. Economic efficiency of grain storage in granaries of annual types and structures.

3.2. Structure of subject

Names of content modules and topics	Number of hours													
	Full-time form							Part-time form						
	weeks	total	including					total	including					
			1	p	lab	ind	self		1	p	lab	ind	self	
2	3	4	5	6	7	8	9	10	11	12	13	14		
Content Module 1. Basics of crop production														
Topic 1. Winter grain crops (winter wheat, winter barley, winter rye).	1	14	2	2	-	-	10							
Topic 2. Early spring grain crops (spring wheat, spring barley, spring oats).	2	14	2	2	-	-	10							
Topic 3. Corn.	3	9	2	2	-	-	5							
Topic 4. Millet.	4	7	1	1	-	-	5							
Total for content module 1	44		7	7	-	-	30							
Content Module 2. Grain processing and storage technologies														
Topic 5. Theoretical aspects of processing and storage of plant products.	5	11	2	2	-	-	7							
Topic 6. Grain mass as a storage object..	6	11	2	2	-	-	7							
Topic 7. Post-harvest processing of grain.	7	12	2	2	-	-	8							
Topic 8. Grain storage. Types of granaries.	8	12	2	2	-	-	8							
Total for content module 2	46		8	8	-	-	30							
	90		15	15			60							
Course project (work) on _____ (if included in the curriculum)														
Total hours	90		15	15			60							

4. Topics of seminar classes.

According to the curriculum, there are no seminar classes.

5. Topics of practical classes

№	Name of practical classes	Numbers, h
Module 1. Basics of crop production		
1	Botanical and morphological features of plants. Wheat, barley. Types of variety	2
2	Botanical and morphological characteristics of wheat, rye, triticale, barley, oats. Types, their characteristics	2
3	Corn. Sorghum. Rice. Peculiarities of the morphological structure. Description according to natural samples.	2
4	Buckwheat. Peculiarities of the morphological structure. Description according to natural samples.	1
Module 2. Grain processing and storage technologies		
5	Determination of contamination of grain by barn pests	2
6	Determining the nature of the grain on a liter scale	2
7	Determination of types and subtypes of grain crops, vitreous of grain	2
8	Determination of the quantity and quality of raw gluten in wheat grain	2
	Total:	15

6. Topics of laboratory classes

According to the curriculum, laboratory classes are not provided.

7. Independent work topics

№	Topic title	Number of hours
1	Winter wheat, winter barley and winter rye. Basic of planting.	10
2	Spring wheat, spring barley and spring oats. Types and phases of grows	10
3	Corn. Types and phases of grows	5
4	Millet. Types and phases of grows	5
5	Classification of grain masses	7
6	Physical and physiological properties of grain	7
7	Self-heating of grain. Types and phases	8
8	Grain granaries. Ways and regimes of storage	8
	Total	60

7. Control questions, sets of tests to determine the level of assimilation of knowledge by students

1. Chemical composition of grain of bread cereals, influence of chemical composition on quality.
2. Classification of grain and seeds by chemical composition. Dependence of grain storage and processing on chemical composition.
3. Technological properties of frostbite, sprouted grain and grain damaged by the shell bug.
4. Ways of improving the quality of grain masses.
5. Characteristics of grain mass as a storage object.
6. Classification of grain mass properties. Physical properties and their importance in the practice of grain storage.
7. Flowability, self-sorting and sorption properties of grain mass, their practical significance in grain storage.
8. Post-harvest ripening of grain and its significance during storage and processing. Conditions affecting the post-harvest ripening process.
9. Respiration of grain during storage, factors affecting its intensity.
10. Effect of gas exchange products on stored grain. Losses of grain dry matter as a result of respiration.
11. Germination and aging of grain during storage and measures to prevent these phenomena.
12. Species composition and characteristics of grain mass microflora.
13. Characteristics of modes and methods of storage of grain masses used in Ukraine
14. Conditions favoring the development of microorganisms in grain mass. Damage caused by microorganisms.
15. Damage caused to the grain mass by collared pests. Ways of contamination of grain and granaries by these pests.
16. Protection of grain mass from pests of grain stocks.
17. The phenomenon and essence of the process of self-heating of grain masses, as well as the conditions contributing to its occurrence. Types of warming up.
18. The influence of self-heating on the quality of seed and food grains. Types and phases of its development. Measures to combat self-heating of grain.
19. Get acquainted with the methods of determining the contamination of grain by pests of grain stocks.
20. To study how the indicator of contamination of grain by collared pests is regulated by the existing grain standards.
21. Get acquainted with the method of determining the contamination of grain of the main crops by collared pests (infection of grain by collared weevil and mite in an obvious form, contamination of

- grain by pests in a hidden form (wheat - weevil, legumes - Bruchus). Study the signs of wheat grain damage by a harmful beetle
22. To study the concept of the nature of the grain and the factors affecting the nature. Get acquainted with the method of determining nature.
 23. Familiarize yourself with the methods of calculating discounts that are used for wheat grain that is dry-warped and severely damaged by the shell bug with a sharply reduced quality.
 24. Familiarize yourself with the methods of determining humidity.
 25. To study what is meant by the terms critical and equilibrium grain moisture. To study the division of grain according to the state of moisture.
 26. Get acquainted with the method of determining the moisture content of corn in the cob.
 27. Familiarize yourself with the methods provided by the state standards for determining grain contamination of various crops.
 28. Familiarize yourself with the grain standard for wheat, rye, peas, corn, millet, and rice and their division into types and subtypes.
 29. Determining the vitreousness of the shenytsia grain on a diaphanoscope.
 30. To study the concept of wheat gluten and its quality.
 31. Learn the method of determining the quantity and quality of gluten.
 32. Familiarize yourself with the terms soft and hard, "strong" and "valuable" wheat.
 33. To study the normalization of the number of fall by standards for wheat and rye grain.
 34. Theoretical foundations of grain storage in a dry state.
 35. General characteristics of the principles and methods of drying grain masses.
 36. Drying of seed and food grains of the most important agricultural crops. Drying mode and control.
 37. Modes of drying grain and seeds. The choice of drying mode depends on the culture, quality and purpose.
 38. Characteristics of the main types of grain dryers used in agriculture.
 39. Theoretical foundations of grain drying.
 40. Technological process and methods of drying seed material on mine dryers.
 41. Technological process and methods of drying seed material on drum dryers.
 42. Active ventilation of grain masses. Basics of application and types of installations.
 43. Conditions and modes of active ventilation of grain masses for the purpose of cooling.
 44. Conditions and regimes of active ventilation of grain masses for the purpose of drying and drying.
 45. To study the procedure of giving and receiving grain.
 46. Using DSTU, learn to determine the class of grain.
 47. Determine the cost of 1 ton of grain depending on the results of the analysis.
 48. To study the method of determining the intensity of grain respiration.
 49. Learn the concept of active ventilation and the functions of active ventilation.
 50. To study the principle of the method of active ventilation and devices for its implementation.
 51. To study the procedure for calculating the size of the working area for grain ventilation with a floor-portable installation.
 52. To study the procedure for determining the expediency of grain mass ventilation using tablets and nomograms.

NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE			
ED Bachelor's Specialization: 076 Entrepreneurship and Trade	Department of Storage, Processing and Standardization of Plant Products after prof. B.V. Lesik	Test paper № 1	APPROVED Head of Department
			H. Podpriatov
Exam questions			
1. <i>Phases of growth and development of grain crops.</i>			
2. <i>Regimes of grain storage</i>			
1. Bread-receiving companies for long term storage of grain are called:			
2. During the storing of plant production we distinguish the following types of losses:			
1	In the weight		
2	In the quality		
3	Destruction by rodents		
4	Destruction by birds		
5	Self-heating		
3. Mechanical types of losses occur due to:			
1	Destruction by birds		
2	Spraying, strewing, injuring		
3	Self-heating		
4	Destruction by rodents		
5	Destruction by ticks, destruction by birds		
4. The composition of components of grain mass does not include:			
1	Wet		
2	Impurities		
3	Grain of basic crop		
4	Microorganisms		
5	Insects and ticks		
5. According to the principles of storage (canning) of plant production by Ya. Nikitinsky, storage and transporting of whole, living organisms, to the processing time is called:			
6. Grain mass is kept well with the humidity:			
1	Critical		
2	Above the critical		
3	Average		
4	High		
5	Low		
7. Divide according to the chemical composition the following cultures into groups:			
A. Rich in protein	1. Rye		
	2. Soybean		
B. Rich in starch	3. Buckwheat		
	4. Oat		
	5. Beans		
		8. Chemical composition of grain mass affect its <u>hygroscopicity</u>:	
1	Yes		
2	No		
		9. Which is term of ripening of oats in optimal conditions:	
		10. Which chemical substances are used for chemical canning of wet grain intended for forage purposes:	
1	Sulphuric acid		
2	Propionic acid		
3	Benzoic acid		
4	Ant acid		
5	Sorbic acid		

7. Teaching methods

Methods of organization and implementation of educational and cognitive activities of students, which are used in the study of the discipline: "Technology of storage and processing of plant products":

1. in the aspect of transmission and perception of educational information:
 - verbal (lecture);
 - visual (illustration, demonstration);
 - practical (laboratory works);
2. in terms of logic and thinking:
 - explanatory and illustrative (presentation);
 - reproductive (short control tests);
3. in terms of training management:
 - educational work under the guidance of a teacher;
 - independent work under the guidance of a teacher;
4. in terms of team activity:
 - methods of stimulation (additional points for essays, participation in Olympiads, conferences);
5. in terms of independent activity:
 - educational module: structural and logical schemes;
 - selective tests.

8. Forms of assessment

Forms of control of students, which are used when studying the discipline: "Technology of storage and processing of plant products": current, borderline and final control.

Current control of knowledge is an organic part of the entire pedagogical process and serves as a means of detecting the degree of perception (assimilation) of educational material. Management of the educational process is possible only on the basis of current control data. The tasks of current control are reduced to:

- 1) to reveal the volume, depth and quality of perception (assimilation) of the studied material;
- 2) identify gaps in knowledge and outline ways to eliminate them;
- 3) to reveal the degree of responsibility of students and their attitude to work, establishing the reasons that prevent their work;
- 4) identify the level of mastery of independent work skills and outline the ways and means of their development;
- 5) stimulate students' interest in the subject and their activity in learning.

The main task of current supervision is to help students organize their work, learn independently, responsibly and systematically study all subjects.

Boundary (thematic, modular, block) control of knowledge is an indicator of the quality of studying individual sections, topics and related cognitive, methodical, psychological and organizational qualities of students.

Border control can be carried out verbally and in writing, in the form of a control work, individually or in a group.

The final control of students is carried out in order to assess their knowledge and skills in the discipline. The main goal is to establish the actual content of students' knowledge in terms of volume, quality and depth and the ability to apply it in practical activities.

The main forms of monitoring students' knowledge are monitoring during lectures, laboratory classes, extracurricular time, consultations and tests.

We monitor lectures either selectively (oral survey of students) or using tests (based on previously taught material).

Current monitoring of lectures is designed to accustom students to systematic study of the passed material and preparation for the upcoming lecture, to establish the degree of assimilation of the theory, to identify the sections that are most difficult for students to understand, followed by their explanation.

Current monitoring of laboratory classes is carried out in order to find out the readiness of students for classes in the following forms:

1. Selective oral survey before the start of classes.
2. Frontal standardized survey on cards, tests within 5-10 minutes.
3. Frontal check of homework.
4. Calling individual students to the blackboard for independent problem solving, written answers to individual questions given in the laboratory session.
5. Evaluation of the student's activity in the process of classes, submitted proposals, original solutions, additions to previous answers, etc.

6. Written test (up to 45 minutes).

Control in extra-auditory time.

1. Checking the course of homework and control work. The quality and accuracy of execution, the accuracy and originality of solutions, the review of special literature, the presence of research elements, the completion of the task in the specified amount according to the specified terms are evaluated.

2. Review of lecture notes and recommended literature.

3. Review and assessment of essays on the part of the lecture course, which is worked out independently.

4. Individual interview with the student at consultations.

Consultations. The purpose of consultations is to help students understand complex issues, to solve those that students cannot solve on their own. At the same time, consultations provide an opportunity to monitor students' knowledge, to form a correct picture of the course and results of educational work.

Exam. When studying the discipline, an exam is used with the presentation of grades on a five-point scale.

Laboratory work is accepted upon completion of each task. At the same time, the student submits records and calculations.

Standardized control of knowledge (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 1 "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.

1. More than 200 tables, drawings, diagrams are used for lectures and laboratory classes.
2. The laboratories are equipped with:
 - 1) stands with natural samples;
 - 2) schemes of post-harvest processing, storage, grain, potato, fruit and vegetable and technical technologies - 20 stands in total;
 - 3) Drawings from individual production processes.
3. Equipment for processing: semi-industrial type mill, small MUL type mills, equipment for obtaining juice, samples of container types, bakery oven, refrigerating chambers, storage for storing juicy products.
4. Out-of-town classes are organized for each stream: within the city of Kyiv - a mill, an elevator, a fruit and vegetable base, and outside of Kyiv: a grain-receiving enterprise, a sugar factory, a compound feed plant, etc.
5. Natural samples of grain of different crops and of different quality (organoleptic indicators, moisture, waste admixture, technological properties).
6. Devices for determining quality:
 - a) grains - POOK-1, POZ (to determine contamination) TransHygro, VZPK, WILE, Elektronika, Farmpro, Aqua-15 (to determine humidity) sets of sieves of all numbers (to determine elements of garbage, grain impurities), diaphanoscopes (to determine vitreous), dough mixer, IDK-1 (for determining the quantity and quality of raw gluten), one-liter flask (for determining the nature), a set of thermometers, probes, BIS-1 device (for grain quality control);
 - b) potatoes (drying cabinets, steam scales, polarimeters, etc.);
 - c) flax: SMT-200 M (industrial sample for evaluating the quality of flax fiber, devices for determining the quality of straw (DL-1, DKV-60, LM-1, squares, moisture meters, device for determining suitability);
 - d) sugar beets (refractometers, polarimeters);
 - e) hops (a device for determining the alpha-acid content).
7. Permanent natural samples:
 - a) grain damaged by pests and diseases;
 - b) harmful elements and other types of impurities;
8. Albums of warehouses, types of linen, projects of warehouses.
9. Natural samples of juicy fresh produce stored in a warehouse or refrigerator.
10. Natural samples of canned products: vegetable and fruit and berry.

11. Recommended sources of information

Basic

1. Gunko S. M. Workbook for the disciplines: "Technology of crop and livestock production" for the students' training direction "Economics" and "Finance, Banking and Insurance". Kyiv : «Centre of information technologies», 2021. 38 p.
2. Gunko, S. M. Guidelines for the discipline: "Technology of crop and livestock production" for the students' training direction "Economics" and "Finance, Banking and Insurance". Kyiv : «Centre of information technologies», 2021. 51 p.
3. Подпратов Г. І., Бобер А. В. Переробка продукції рослинництва: навч. посіб. Київ : ЦП «Компринт», 2017. 524 с.
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5. Скалецька Л. Ф., Бобер А. В., Рожко В. І., Хомічак Л. М. Переробка продукції рослинництва: лабораторний практикум (навчальний посібник). Київ : Центр інформаційних технологій, 2013. 360 с.

6. Подпряттов Г. І., Бобер А. В., Ящук Н. О. Технохімічний контроль продукції рослинництва : навч. посіб. 2-е вид., допов. і перероб. Київ : ЦП «Компринт», 2020. 791 с.

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Information resources

URL:<https://agrovektor.com/ua/art/1116-aktivne-ventilyuvannya-zerna-zaporuka-zberezheniya-vrozhayu.html>

Відповідність обладнання для зберігання зерна вимогам стандартів

URL: <https://agroexpert.ua/vidpovidnist-obladnannia-dlia-zberihannia-zerna-vymoham-standartiv/>
Що таке сучасний зерновий елеватор?

URL: <https://agroelita.info/scho-take-suchasnyj-zernovyj-elevator/>
Сучасні технології сушіння зерна

URL: <http://agronomy.com.ua/statti/515-suchasni-tekhnohii-sushinnia-zerna.html>
Зберігання і переробка продукції рослинництва

URL: <https://buklib.net/books/21971/>
Сільськогосподарський портал

URL: <http://www.agromage.com/vegetable.php>
Практикум

URL: <http://www.tpk-lord.com>

Післязбиральна обробка зерна

URL:<http://agro-business.com.ua/agro/mekhanizatsiia-apk/item/8932-pislyazbyralna-obrobka-nasinnia.html>

Яку зерносушарку вибрати: шахтну, модульну чи мобільну?

URL: <https://www.susharka.com.ua/pytannya/iaku-susharku-obraty>