COURSE SYLLABUS
«Technology of storage and processing of crop products»

Degree of higher education - Bachelor
Specialization 201 Agronomy
Educational programme «Agronomy»
Academic year 4, semester 7
Form of study full-time
Number of ECTS credits 5.0
Language of instruction English

Lecturer of the course	**Sergiy Gunko**
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Course page on eLearn	**https://elearn.nubip.edu.ua/course/view.php?id=2742**

COURSE DESCRIPTION

(up to 1000 printed characters)

The discipline is studied in the final year of the Bachelor's degree program for specialists in agricultural science, after students have already learned the agronomy of growing various cereal, legume, groat, oilseed, technical, vegetable, and fruit crops. The program includes technology for post-harvest processing, storage, and primary processing of various types of cereal, groat, and legume crops for different purposes, as well as fruits, vegetables, potatoes, berries, and technical crops (such as sugar beets, flax, hops, and essential oils). The course curriculum covers the study of crop storability and its ability to produce certain processed products under favorable growing conditions and under deviations, as well as how protective factors and agrochemicals affect the quality of fresh or processed products. The basics of drying, cooling, chemical preservation, and storage of grain and other types of products are also covered. The course also examines the impact of growing and post-harvest processing factors on the storability of potatoes and vegetables, the theoretical foundations of long-term storage, and the basics of primary processing of agricultural products. Students will learn to meet the standards for agricultural products and to evaluate the quality of agricultural products in accordance with these standards. Become an expert in the field.

Competencies of the educational programme:

Integrative 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): GC 6. Knowledge and understanding of the subject area and professional activity; *GC 7.* Ability to apply knowledge in practical situations; *GC 8.* Skills for performing safe activities; *GC 9.* Ability to search for, process, and analyze information from various sources.

Professional (special) competencies (PC): PC 2. The ability to cultivate, propagate, and manage agricultural crops, and carry out technological operations for primary processing and storage of products; *PC* 4. The ability to apply knowledge and understanding of physiological processes of agricultural plants to solve production and technological tasks; *PC* 9. The ability to manage complex actions or projects, with responsibility for making decisions in specific production conditions.

Program learning outcomes (PLO) of the educational programme: PLO 4. Compare and evaluate modern scientific and technical achievements in the field of agronomy; PLO 6. Demonstrate knowledge and understanding of fundamental disciplines to the extent necessary to possess relevant skills in the field of agronomy; PLO 10. Analyze and integrate knowledge from general and specialized professional training to the extent necessary for specialized professional work in the field of agronomy; PLO 11. Initiate timely and appropriate solutions to production problems in accordance with zonal conditions. PLO 13. Design and organize events for the cultivation of high-quality agricultural products in accordance with current requirements; PLO 14. Integrate and improve production processes for the cultivation of agricultural products in

accordance with current requirements; PLO 15. Plan economically viable production of agricultural products.

COURSE STRUCTURE

Topic	Hours (lecture/laboratory, practical, seminar)	Learning outcomes	Tasks	Assessment
Semester 7				
Module 1				
Topic 1 Importance of the field of storage and processing of plant products / Sampling of point samples, compilation of combined and average daily samples; Organoleptic (sensory) assessment of grain.	2/4/4	To know and understand the importance of the field of storage and processing of plant products for modern farming conditions. Master the methods and acquire practical skills for taking point samples and forming average and average daily samples from different batches of grain. Acquisition of practical skills in determining organoleptic indicators of grain quality.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 1 – 10; L.w. 1 – 10; L.w. 2 – 10
Topic 2. Grain mass as an object of post-harvest processing and storage / Determination of grain contamination by collared pests and damage by the shell bug; Determining the nature of the grain on a liter scale.	2/4/4	Know and understand the importance of the components of grain mass and their influence on the preservation of grain and grain products. Be able to determine contamination of grain by collared pests and damage by the shell bug. Mastering the methodology and acquiring practical skills for determining the nature of grain on a liter scale.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 2 – 10; L.w. 3 – 10 балів; L.w. 4 – 10 балів.
Topic 3. Physical and physiological properties of cereal masses. Self-heating of grain masses / Determination of grain moisture; Determination of the content of impurities in grain (seeds).	3/4/4	To know the physical and physiological properties of grain mass as a storage object. To be able to determine moisture content and the content of impurities in grain (seeds).	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work. Writing content module 1 in ENK through the Elearn system.	Topic 3 – 20; L.w. 5 – 10; L.w. 6 – 10
Total for 1 Module				**100**
Module 2				
Topic 1. Post-harvest processing of grain masses / Technological	2/4/2	To know the technology of post-harvest processing of grain products. To be able to recommend the technology of post-harvest processing	Having a completed assignment in a notebook for	Topic 1 – 8; L.w. 10 – 10

calculations on grain and seed cleaning		of the grain mass that arrives after harvesting. To master the methods of carrying out calculations for the cleaning of grain and seeds.	laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	
Topic 2. Active ventilation of grain masses. Grain drying, methods and methods of drying / Technological calculations on grain and seed drying; Active ventilation of grain masses.	4/4/2	Know the technology of active ventilation and drying of grain masses. Be able to control technological parameters and grain products in the process of active ventilation and drying. To master the methods of carrying out calculations on ventilation and drying of grain and seeds.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 2 – 8; L.w. 11 – 10; L.w. 12 – 10
Topic 3. General principles of storage of plant raw materials / Determination of types and subtypes of grain crops	2/4/2	Know the basic principles of storage of plant products - fresh and processed. To be able to determine the need for storage facilities, to draw up a plan for depositing grain for various purposes in storage facilities. Master the methods of determining types and subtypes of grain crops.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 3 – 8; L.w. 7 – 10
Topic 4. Basics of processing grain into flour and bakery production / Determination of the quantity and quality of crude gluten in wheat grain.	4/4/4	To know the peculiarities of grain products as an object of processing. Understand the basics of grain processing technologies and bakery production technologies. To be able to control the processing of grain products and the technology of bakery production. Master the methods of determining the quantity and quality of raw gluten in wheat grains.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 4 – 8; L.w. 8 – 10
Topic 5. Fundamentals of cereal grain and oilseed processing / Determination of the autolytic activity of	4/4/4	To know the peculiarities of grain and oil crops as an object of processing. Understand the basics of grain and oil production technologies. Be able to control the processing of cereal crops. master the methods of determining the	Having a completed assignment in a notebook for laboratory work and sending an electronic file	Topic 5 – 8; L.w. 9 – 10

grain and flour by the number of falls on the Hagberg-Perten device.		autolytic activity of grain and flour by the number of falls on the Hagberg-Perten device.	with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work. Writing content module 2 and crediting in ENK through the Elearn system.	
Total for 2 Module				**100**
		Модуль 3		
Topic 1. Post-harvest processing and storage of vegetable crops / Placement of grain stocks (seeds) for storage; Quantitative - qualitative accounting of grain during post-harvest processing and storage.	4/6/4	To know the peculiarities of vegetable production as an object of post-harvest processing and storage. To be able to recommend the technology of post-harvest processing and storage of vegetables that arrive after harvesting. Be able to control the process of long-term storage of vegetables.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 1 – 10; L.w. 13 – 10; L.w. 14 – 10
Topic 2. Post-harvest processing and storage of potato tubers / Calculations for grain depending on its quality.	2/4/2	To know the features of potato tubers as an object of post-harvest processing and storage. To be able to recommend the technology of post-harvest processing and storage of potato tubers that arrive after harvesting. Be able to monitor the long-term storage of potato tubers.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 2 – 10; L.w. 15 – 10
Topic 3. Features of post-harvest processing and storage of fruit and berry products / Evaluation of grain quality of cereal crops	4/6/4	To know the peculiarities of fruit and berry products as an object of post-harvest processing and storage. Be able to recommend the technology of post-harvest processing and storage of fruit and berry products that arrive after harvesting. Be able to control the process of long-term storage of fruit and berry products.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work.	Topic 3 – 10; L.w. 16 – 10
Topic 4. Fundamentals of fruit and vegetable processing /	4/6/3	To know the features of fruit and vegetable products as a processing object, the basics of fruit and vegetable processing technologies, features of	Having a completed assignment in a notebook for laboratory work	Topic 4 – 10; L.w. 17 – 10; L.w. 18 – 10

Determination of flour quality; Evaluation of the quality of flour by the method of laboratory test baking.		finished (processed) fruit and vegetable products as storage objects. Be able to prepare a batch of fruit and vegetable products for processing and sale. Be able to determine methods of processing fruit and vegetable products.	and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work. Writing content module 3 in ENK through the Elearn system.	
Total for 3 Module				**100**
Module 4				
Topic 1. Basics of post-harvest processing, storage and processing of technical raw materials / Determining the quality of potato tubers; Storage of potatoes and vegetables in temporary (field) storage; Organization of fruit and vegetable storage	4/4/4	To know the technology of post-harvest processing, storage and processing of technical raw materials. To be able to control the quality of raw materials of industrial crops (sugar beet, oilseed, linseed).	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work. Writing content module 3 in ENK through the Elearn system.	Topic 1 – 20; L.w. 19 – 10; L.w. 20 – 10; L.w. 21 – 10
Topic 2. Fundamentals of technology for the production and storage of compound feed and feed of plant origin / Production of sauerkraut; Assessment of the quality of technical purpose sugar beets; Evaluation of the quality of raw flax.	4/2/2	To know the technology of production and storage of compound feed and feed of plant origin. To be able to control the quality of execution of technological processes and the quality of feed and feed of plant origin.	Having a completed assignment in a notebook for laboratory work and sending an electronic file with the completed assignments to the ENC through the Elearn system. Written and oral answers to questions for laboratory work. Writing content module 4 and exam in ENK through the Elearn system. Total for 4 modules	Topic 2 – 20; L.w. 22 – 10; L.w. 23 – 10; L.w. 24 – 10
Total for 4 Module				**100**
Total for 7 semester				**70**
Exam				**30**
Total for course				**100**

ASSESSMENT POLICY

Policy regarding deadlines and resits:	Assignments submitted after the deadline without valid reasons will be graded lower. Resiting of modules will be allowed with the permission from the lecturer and in the presence of valid reasons (e.g. medical reasons).
Academic honesty policy:	Cheating during tests and exams is strictly prohibited (including the use of mobile devices). Coursework and research papers must contain correct citations for all sources used.
Attendance policy:	Class attendance is mandatory. In case of objective reasons (such as illness or international internships), individual learning may be allowed (in online format by the approval of the dean of the faculty).

SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

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

RECOMMENDED SOURCES OF INFORMATION

Basic

1. Осокіна Н.М. Технологія зберігання і переробки продукції рослинництва: підручник. / Н.М. Осокіна, Г.С. Гайдай. – Умань.: Уманське видавничо-поліграфічне підприємство, 2005. – 614 с.
2. Подпрятов Г.І. Післязбиральна доробка та зберігання продукції рослинництва: лабораторний практикум (навчальний посібник). / Г.І. Подпрятов, Л.Ф. Скалецька, А.В. Бобер. – К.: Центр інформаційних технологій, 2009. – 296 с.
3. Подпрятов Г.І. Зберігання і переробка продукції рослинництва: навч. посіб. / Г.І. Подпрятов, Л.Ф. Скалецька, А.М. Сеньков. – К.: Центр інформаційних технологій, 2010. – 495 с.
4. Подпрятов Г.І. Переробка продукції рослинництва: Навчальний посібник / Г.І. Подпрятов, А.В. Бобер. – К.: ЦП «Компринт», 2017. – 524 с.
5. Подпрятов Г.І. Післязбиральна доробка та зберігання продукції рослинництва. Навчальний посібник / Г.І. Подпрятов, А.В. Бобер. – К.: Редакційно-видавничий відділ НУБіП України, 2019. – 492 с.
6. Скалецька Л.Ф. Переробка продукції рослинництва: лабораторний практикум (навчальний посібник). / Л.Ф. Скалецька, А.В. Бобер, В.І. Рожко, Л.М. Хомічак. – К.: Центр інформаційних технологій, 2013. – 360 с.
7. Подпрятов Г.І., Бобер А.В., Ящук Н.О. Технохімічний контроль продукції рослинництва. Навчальний посібник. 2-е вид., допов. і перероб. – К.: ЦП «Компринт», 2020. – 791 с.
8. Подпрятов Г.І., Бобер А.В., Ящук Н.О. Технохімічний контроль продукції рослинництва. Підручник. – К.: ЦП «Компринт», 2022. – 790 с.

Addition

1. Колтунов В.А. Технологія зберігання продовольчих товарів: підручник / К.: Київ. нац. торг.-екон. ун-т, 2003. – 538 с.
2. Колтунов В.А. Якість плодоовочевої продукції та технологія її зберігання. Ч. 1. Якість і збереженість картоплі та овочів: монографія / В.А. Колтунов. – К.: Київ. нац. торг.-екон. ун-т, 2004. – 568 с.
3. Подрятов Г.І. Технологія виробництва борошна, крупи та олії: навч. посіб. / Г.І. Подрятов, Скалецька Л.Ф. – К.: Видавництво НАУ, 2000 – 202 с.

4. Подпрятов Г.І. Технологія обробки, переробки зерна та виготовлення хлібопекарської продукції / Г.І. Подпрятов – К.: Видавництво НАУ, 2000 – 125 с.
5. Подпрятов Г.І. Основи стандартизації, управління якістю та сертифікація продукції рослинництва / [Подпрятов Г.І., Войцехівський В.І., Мацейко Л.М., Рожко В.І.]. – Луцьк: Терен, 2011. – 752 с.
6. Подпрятов Г.І. Стандартизація та контроль якості продукції рослинництва: практикум / [Подпрятов Г.І., Скалецька Л.Ф., Войцехівський В.І., Мацейко Л.М.]. – Луцьк: Терен, 2012. – 448 .
7. Скалецька Л.Ф. Біохімічні зміни продукції рослинництва при її зберіганні та переробці: навч. посіб. / Л.Ф. Скалецька, Г.І. Подпрятов. – К.: Центр інформаційних технологій, 2010. – 288 с.

Information resources

https://agrovektor.com/ua/art/1116-aktivne-ventilyuvannya-zerna-zaporuka-zberezhennya-vrozhayu.html
https://agroexpert.ua/vidpovidnist-obladnannia-dlia-zberihannia-zerna-vymoham-standartiv/
https://agroelita.info/scho-take-suchasnyj-zernovyj-elevator/
http://agronomy.com.ua/statti/515-suchasni-tekhnolohii-sushinnia-zerna.html
https://agrosepmash.ua/uk/yak-vidbuvayetsya-ochishhennya-zernovix-etapi-ta-obladnannya/
http://agro-business.com.ua/agro/mekhanizatsiia-apk/item/8931-suchasni-zernoochysni-mashyny.htmlммм
https://agrosepmash.ua/uk/porivnyannya-suchasnix-separatoriv-zerna-rbs-iz-bcs-ta-ovs/
https://ravaro.com.ua/products-ua/zernosusharki-potochni
https://www.susharka.com/ua/pytannya/iaku-susharku-obraty
http://www.eridon-tech.com.ua/sukup-mixed-flow-dryers/
http://agro-business.com.ua/agro/zberihannia/item/8235-umovy-zberihannia-fruktiv-ta-ovochiv-u-skhovyshchakh.html
https://uhbdp.org/eco-articles/pravyla-zberihannia-ovochevoi-produktsii-u-skhovyshchi
https://elib.lntu.edu.ua/sites/default/files/elib_upload/%D0%95%D0%9F%D0%94%D1%96%D0%B4%D1%83%D1%85/part15.html