

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SUMY NATIONAL AGRARIAN UNIVERSITY

Faculty of Food Technology

Department of Food Technology and Safety

Syllabus of the educational component

of the Educational Component

MC20 TECHNOLOGY OF PLANT RAW MATERIAL PROCESSING

(mandatory)

Implemented within the educational program

18 – Manufacturing and Technology

in specialty **181 – Food Technology**

at **the first (bachelor's)** level of higher education

Sumy – 2026

Developer:

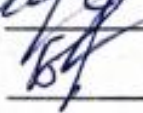


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Reviewed, approved and approved on meetings departments Food Technology and Safety	protocol dated <u>19.05</u> 2026 No. <u>17</u>
	Manager departments <u></u> Maryna SAMILYK (signature)

Agreed:

Guarantor of the educational program "Food Technologies"  Olena KOSHEL

Dean of the Faculty of Food Technology  Nataliia BOLHOVA

Review of the working program provided by:



Oksana MELNYK, Candidate of Technical Sciences, Associate Professor



Anna HELIKH, Candidate of Technical Sciences, Associate Professor

Methodist of the Education Quality,
Licensing and Accreditation Department


(signature)

N. Bananik
(first name, surname)

Registered in the electronic database: date: 18.06 2026

Information on Review of the Working Program (Syllabus)

Educational the year in which are introduced changes	Number of the appendix to the work program with a description of the changes	Changes reviewed and approved		
		Date and number minutes of the meeting departments	Head of the Department	Guarantor educational programs

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

Name of the educational component	MC20 Technology of Plant Raw Material Processing					
Status of the educational component	Mandatory					
Faculty / Department	Faculty of Food Technology; Department of Food Technology and Safety					
Program / Specialty for which the component is included	Educational and Professional Program “Food Technologies” (2025); Specialty 181 Food Technologies					
NQF level	Level 6					
Semester and duration of study	Semester 5, weeks 1–15					
Number of ECTS credits	5.0					
Total workload and distribution of hours: 150	Contact work (classes)				Independent work	
	Lectures		Practical classes			
	Daily	Abroad.	Daily	Abroad.	Daily	Abroad.
	30	-	30	-	90	-
Language of instruction	Ukrainian, English					
Instructor / Coordinator of the educational component	Tetiana SYNENKO, PhD, Associate Professor of the Department of Food Technology and Safety					
Contact information	Room 317m; Tel.: +380684870521; E-mail: tatiana.synenko@snau.edu.ua					
General description of the educational component	The educational component ensures the acquisition of in-depth knowledge and practical experience in organising and supervising the processing of plant-based raw materials within the field of food production technologies.					
Purpose of the educational component	to equip students with theoretical and practical knowledge of the fundamental principles of processing plant-based raw materials; to enable them to acquire the necessary skills to manage the processes and technical operations involved in the production of various food products from plant-based raw materials, and to assess the quality of plant-based raw materials and finished products.					
Prerequisites and links with other EPP educational components	1. The educational component is based on prior study of the following subjects: ‘Theoretical Foundations of Food Production’, ‘Food Microbiology’, ‘Food Control Methods’, ‘Fundamentals of Nutrition Physiology and Hygiene’, and ‘Food Production Processes and Equipment’ 2. The educational component forms the basis for the writing of the dissertation					
Academic integrity policy	The study of the discipline is based on academic integrity principles and compliance with the requirements specified in the Regulation on Academic Integrity of Sumy National Agrarian University.					
Course link	https://cdn.snau.edu.ua/moodle/course/view.php?id=6374					
Keywords	food technology, plant-based raw materials, fruit, vegetables, berries, oil, seeds, cereals, canning					

2. LEARNING OUTCOMES OF THE EDUCATIONAL COMPONENT AND THEIR RELATION TO PROGRAM LEARNING OUTCOMES

After completing the educational component, the student is expected to be able to:

[illegible]

Code	Course Learning Outcome «After studying the educational component, the student is expected to be able to... »	Program Learning Outcome(s) addressed														Assessment methods
		PLO 1	PLO 5	PLO 6	PLO 8	PLO 9	PLO 10	PLO 14	PLO 17	PLO 19	PLO 20	PLO 21	PLO 24	PLO 30		
CLO7	Analyse the implementation of resource-efficient and competitive technologies, taking into account the demand for plant-based products.							x								
CLO8	Study and analyse the waste disposal process, taking environmental safety into account.								x							
CLO9	Carry out independent work in collaboration with the team									x						
CLO10	Maintain business records in the official language.										x					
CLO11	Able to present the results of their work to a professional audience.											x				
CLO12	Prepare technical documentation; carry out technical calculations for raw materials and finished products.												x			
CLO13	Carry out the modelling of technological processes with a view to production.													x		

Competencies Improved / Acquired through Non-formal Education

Non-formal education course	Competencies	Evidence of learning outcomes
Modern berry freezing techniques	General: the ability to learn and acquire up-to-date knowledge; the ability to show initiative and enterprise; skills in using information and communication technologies. Professional: demonstrating practical knowledge of berry freezing technologies.	Form of confirmation of learning outcomes: A certificate of successful completion of the course, stating the number of hours. The authenticity of the certificate can be verified via the link provided on it.

3. CONTENT OF THE EDUCATIONAL COMPONENT (PROGRAM ACADEMIC DISCIPLINE)

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent-study hours (Daily /Abroad.)	Recommended literature
MODULE 1			
Lecture 1. Theoretical Foundations of Plant Material Processing 1. General Course Overview 2. Classification of Plant Materials for Processing in the Food Industry 3. Principles of Storage and Preservation of Plant Products 4. Principles of Planning a Plant Material Processing System	2		1-12
Laboratory Session 1 Modelling of processing routes for plant-based raw materials		2	1-12
Independent study: The current state of the plant-based raw materials processing industry in Ukraine		6	1-12
Lecture 2. Quality requirements for plant-based raw materials 1. Factors affecting the quality and shelf life of products made from plant-based raw materials 2. Factors leading to the spoilage of plant-based raw materials	2		1-12
Laboratory Session 2 The quality of plant raw materials and methods for analysing them		2	1-12
Independent study: Technological methods for minimising spoilage of plant raw materials and products derived from them		6	1-12
Lecture 3. Fundamentals of Oilseed Processing 1. The nutritional and industrial value of oilseed raw materials 2. The relationship between seed quality and oil quality 3. Classification of oil types and methods of oil extraction 4. Characteristics of the mechanical method of vegetable oil production 5. Characteristics of the extraction method for producing vegetable oils 6. Technological processes for oil purification	2		1-12

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent- study hours (Daily /Abroad.)	Recommended literature
Laboratory Session 3 Assessment of the quality of oilseed raw materials. Extraction of oil using mechanical and solvent extraction methods under laboratory conditions.		2	1-12
Independent study: 1. Waste products from vegetable oil production, their uses and storage requirements 2. Commercial classification of raw materials from essential oil crops 3. Essential oil production technology.		6	1-12
Lecture 4. Processing Technology for Cereal and Legume Crops 1. Characteristics of Cereal and Legume Crops 2. Fundamentals of Post-Harvest Processing Technologies for Cereals and Legumes 2. Main Stages in the Processing of Grain into Groats and Cereal Products 3. Utilisation of Waste from the Processing of Cereal and Legume Crops	2		1-12
Laboratory Session 4 Assessment of the quality of cereals and pulses. Modelling of cereal production technology.		2	1-12
Independent study: 1. Quality requirements for grain used in cereal production 2. Quality indicators for cereals in accordance with DSTU		6	1-12
Lecture 5. Starch production technology 1. Raw materials for starch production 2. Potato starch production technology 3. Maize starch production technology 4. Wheat starch production 5. Rice starch production	2		1-12
Laboratory Session 5 Modelling starch production technology. Assessment of the quality of potato and maize starch		2	1-12
Independent study: 1. Production and use of modified starches 2. Production and use of dextrins		6	1-12

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent- study hours (Daily /Abroad.)	Recommended literature
Lecture 6. Processing technology for sugar-containing raw materials 1. Raw materials for sugar production from sugar beet 2. Alternative sources of sucrose 3. Preparation of sugar-containing raw materials for processing 4. The technological process for producing granulated sugar and refined sugar 5. Utilisation of sugar production waste	2		1-12
Laboratory Session 6 Assessment of sugar quality. Comparison of sugar from different sources. Introduction to the types of waste produced in sugar beet processing		2	1-12
Independent study: 1. Innovative technologies in sugar beet production 2. Resource- and energy-efficient sugar production technologies 3. Production of marketable products using by-products and waste from sugar production 4. Monitoring and control of the technological process in sugar beet production.		6	1-12
Lecture 7. Hop Processing Technology 1. The importance of hops in the food industry 2. Hop harvesting and processing techniques 3. Principles of preparing hop cones for use	2		1-12
Laboratory Session 7 Assessing the quality of hop cones		2	1-12
Independent study: Hop harvesting techniques, post-harvest processing and storage		6	1-12
MODULE 2			
Lecture 8. General properties of fruit and vegetable raw materials as products for storage and processing 1. Characteristics of fruit and vegetable raw materials as products for processing 2. Chemical composition and nutritional value of fruit and vegetables 3. Factors contributing to the spoilage of fruit and vegetable raw materials	2		1-12

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent- study hours (Daily /Abroad.)	Recommended literature
Laboratory Session 8 Investigation of the chemical composition of vegetables and fruit.		2	1-12
Independent study: The role of the chemical composition of fruit and vegetables in storage, processing and human nutrition		6	1-12
Lecture 9. Characteristics of post-harvest processing and storage of fruit and vegetable produce 1. Theoretical principles of fruit and vegetable storage 2. Post-harvest processing and storage of root vegetables 3. Storage conditions and methods for fruit and vegetable crops 4. Post-harvest processing and storage of fruit	2		1-12
Laboratory Session 9 An introduction to storage conditions and storage losses in fruit and vegetables. Simulation of storage conditions for fruit and vegetable produce in a laboratory setting.		2	1-12
Independent study: 1. Specific features of storing certain types of vegetables, fruit and berries 2. Losses of vegetables, fruit and berries during storage 3. Rules for writing off perishable produce when carrying out quantitative and qualitative stock-taking 4. Theoretical principles of fruit and vegetable storage		6	1-12
Lecture 10. General methods of preserving fruit and vegetable produce 1. Fresh storage 2. Preservation by dehydration: drying/dehydration and concentration 3. Chemical preservation 4. Preservation by acidification 5. Preservation with sugar 6. Thermal preservation/heat treatment 7. Irradiation	2		1-12

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent- study hours (Daily /Abroad.)	Recommended literature
Laboratory Session 10 Determining and comparing the effects of fruit and vegetable preservation methods on the retention of sensory appeal, nutritional value and biological value		2	1-12
Independent study: 1. Quality requirements for raw materials used in the production of tinned foods 2. Preparation of raw materials for tanning 3. Innovative methods for preserving plant-based raw materials 4. Packaging materials for tinned fruit and vegetable products		6	1-12
Lecture 11. Specific vegetable preservation techniques 1. Characteristics of fresh vegetable storage 2. Vegetable dehydration techniques 3. Vegetable pickling and fermentation techniques 4. Vegetable preservation techniques	2		1-12
Laboratory Session 11 Modelling vegetable canning processes. Production of tinned vegetables in the laboratory		2	1-12
Independent study: The latest trends in vegetable processing		6	1-12
Lecture 12. Specific preservation techniques for fruit and berries 1. Characteristics of fresh fruit storage 2. Fruit dehydration techniques 3. Fruit and berry soaking techniques 4. Sugar-preserved products: jams, jellies, marmalades, fruit pastes	2		1-12
Laboratory Session 12 Modelling of fruit preserve production techniques using sugar. Production of fruit preserves in the laboratory		2	1-12
Independent study: The latest trends in fruit and berry processing		6	1-12

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent- study hours (Daily /Abroad.)	Recommended literature
Lecture 13. Juice and Compote Production Techniques 1. Characteristics of natural juice production 2. Production techniques for fruit and vegetable juices 3. Production techniques for fruit and berry juices 4. Production techniques for fruit and berry compotes	2		1-12
Laboratory Session 13 An overview of the quality requirements for raw materials used in the production of natural juices. Calculating the concentration of solutions and the quantity of raw materials required for preservation		2	1-12
Independent study: 1. Physiological and biochemical principles of juice production 2. By-products in juice production and methods of their utilisation		6	1-12
Lecture 14. Characteristics of nut processing 1. Receipt and initial processing of nuts 2. Nut storage techniques 3. Treatment and drying of nuts	2		1-12
Laboratory Session 14 Analysis of the quality of nuts and nut-based products Modelling of nut processing technology under laboratory conditions		2	1-12
Independent study: By-products from nut processing and ways of using them		6	1-12
Lecture 15. Characteristics of potato tuber storage and processing 1. Characteristics of potato tubers as a storage commodity 2. Post-harvest handling and storage of potato tubers 3. Processing of potato tubers: freezing, dehydration	2		1-12
Laboratory Session 15 Assessment of the quality of potatoes for consumption. Production of semi-finished potato products and finished products under laboratory conditions		2	1-12
Independent study: Methods for storing potatoes for different purposes		6	1-12

Topic. List of issues to be addressed within the topic	Lecture hours (Daily /Abroad.)	Practical or independent- study hours (Daily /Abroad.)	Recommended literature
Non-formal education: Modern berry freezing technologies: 1. The global market for frozen berries 2. Berry freezing: the physics of the process 3. The technological process and equipment for freezing berries 4. The production process. Preparation and freezing 5. Production process. Sorting and packaging 6. Specifications, quality and food safety		2	https://courses.agriacademy.org/courses/course-v1:EBRD+BERRIES101+2022_T3/about
Total for the course	30	practical: 30; independent study: 90	

4. TEACHING AND LEARNING METHODS

CLO	Teaching methods	Hours	Learning methods	Hours
CLO1– CLO13	Verbal teaching methods: - visualised lecture, - narrative, - explanation, - instruction, - discussion (revision, reproductive), - educational discussion, - demonstration, - independent observation. Practical teaching methods: - laboratory work, - analysis method, - comparison method, - concretisation method. Interactive teaching strategies: - discussion, - error analysis, - expert assessment, - mind map.	60	Self-study will be supported by the creation of lecture notes and a workbook, as well as preparation for module assessments.	90

5. ASSESSMENT FOR THE EDUCATIONAL COMPONENT

5.1. Summative Assessment

The following methods are used to assess expected learning outcomes:

No.	Summative assessment method	Points / weight in the final grade	Deadline
Module 1 (50 points)			
1	Defense of practical works (7 works × 3 points)	21 points / 21%	Within 5 days after the class
2	Testing (multiple-choice test)	29 points / 29%	Week 7
Module 2 (50 points)			
3	Defense of practical works (8 works × 3 points)	24 points / 24%	Within 5 days after the class
4	Testing (multiple-choice test)	26 points / 26%	Week 15
5	Non-formal education (additional/bonus)	10 bonus points	Week 15

5.1.2. Assessment Criteria

Component	Criteria
Defense of a practical work	0 points: the student completed the practical work but did not defend it. 1 point: most requirements are met, but some elements are missing. 2 points: all task requirements are met. 3 points: all task requirements are met; thoughtful work is demonstrated and an original solution to the problem is proposed.
Testing (multiple-choice test)	The test includes 29 questions in Module 1 and 26 questions in Module 2. Each correct answer is worth 1 point.
Non-formal education	Successful completion of an online course confirmed by a named certificate is evaluated as 10 bonus points.

5.2. Formative Assessment

The following elements are used to assess current learning progress and identify areas for further improvement:

No.	Formative assessment element	Date
1	Oral questioning after studying course topics	Within 5 days after the class
2	Oral feedback from the instructor and students during practical classes	During the semester
3	Feedback through discussion of intermediate and final testing	Weeks 7 and 15
4	Feedback through discussion of the non-formal education course, conference report, article or scientific work	Before and after completing the course, participating in the conference/competition, or publishing the work

Final assessment form – differentiated credit. The final number of points for the discipline (maximum 100 points per semester) is determined as the sum of points earned by the student during the semester.

A student is not admitted to the final assessment if the student has missed and not made up more than 20% of classes, has not completed modular control stages, has not completed the mandatory list of works and tasks provided in the working curriculum for the semester, or has an unsatisfactory semester rating (0–41 points).

6. EDUCATIONAL RESOURCES (LITERATURE)

Main Sources

1. Technologies for the Processing of Plant Raw Materials: a course of lectures for students of the vocational education programme 'Food Technologies' (full-time and part-time modes of study) leading to a Bachelor's degree / compiled by T.P. Synenko. Sumy: SNAU, 2025. p. 137.

2. Technologies for processing plant raw materials: methodological guidelines for laboratory work for students of the educational and professional programme 'Food Technologies' in full-time and part-time modes of study leading to a Bachelor's degree / compiled by T.P. Synenko. Sumy: SNAU, 2025. p. 80.

3. Technologies for the processing of plant raw materials: workbook of laboratory exercises for students of the educational and professional programme 'Food Technologies' in full-time and part-time modes of study leading to a Bachelor's degree / compiled by T.P. Synenko Sumy: SNAU, 2025. p. 85.

4. Technologies for processing plant raw materials. Teaching and learning package for first-year students of speciality 181 'Food Technologies' in full-time and part-time study programmes, leading to a Bachelor's degree. Synenko T.P., Samilik M.M. Sumy: Sumy National Agrarian University, 2021. p. 282.

5. Synenko T.P., Demidova E.V. Technologies for the processing of plant raw materials: a study guide. Sumy: SNAU, 2025. 276 pp.

Additional Sources

6. Jeanroy A. Canning and Preserving for Dummies. Wiley & Sons, Incorporated, John, 2021. 448 p.

7. Postharvest Technology of Fruits and Vegetables / edited by D.-W. Sun. Amsterdam : Elsevier, 2022. 890 p.

8. Frozen Food Science and Technology / J. A. Evans. Oxford : Wiley-Blackwell, 2023. 512 p.

9. Івашків Л. Я. Інноваційні технології харчової продукції : навч. посіб.-практикум / Л. Я. Івашків, Н. Р.-Й. Джурик. Львів : Ліга-Прес, 2022. 172 с.

10. Study of the effect of powdered food additives from wild berries on the quality of pasta / T. Synenko et al. *Food Science and Technology*. 2025. Vol. 19, no. 4. P. 95–103. URL: <https://doi.org/10.15673/fst.v19i4.3302>

11. Synenko T. P., Tkachenko A. O. The use of acorn powder as an alternative plant-based raw material in the production of gingerbread. *Bulletin of Sumy National Agrarian University. The series: Mechanization and Automation of Production Processes*. 2026. № 1. C. 95–101. URL: <https://doi.org/10.32782/msnau.2026.1.15>

12. Research of the vacuum low-temperature frying process *Pleurotus eryngii* / N. Bolhova et al. *Ukrainian Black Sea Region Agrarian Science*. 2024. Vol. 28, no. 1. P. 66–78. URL: <https://doi.org/10.56407/bs.agrarian/1.2024.66>

Electronic Resources

1. Research Department of Sumy National Agrarian University – <https://science.snau.edu.ua>

2. Scientific Library of Sumy National Agrarian University – <https://library.snau.edu.ua>

3. V.I. Vernadskyi National Library of Ukraine – www.nbuv.gov.ua