

Ministry of Education and Science of Ukraine  
Sumy National Agrarian University  
Faculty of Food Technologies  
Department of Technologies of Nutrition

**Educational component syllabus**

**OK 6 Modeling and planning of a scientific experiment**

Mandatory

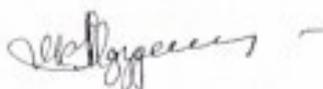
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(name and status (required/optional))

Implemented within the educational program  
**"Food Technologies"**  
in specialty 181 "Food Technology"

HE level - Doctor of Philosophy

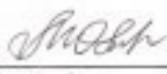
Developer



**Mazurenko AND.K.**, Professor of the  
Department Technologies of Nutrition,  
Doctor of Technical Sciences

Reviewed, approved and ratified on department meeting Technologies (name of department)	minutes of May 31, 2024, No. 19
	Manager departments  <u>Oksana Melnyk</u> (signature) (last name, initials)

**Agreed:**

Educational program guarantor  Oksana Melnyk  
(signature) (Full name)

Dean of the Faculty,

where the educational program is implemented  Nataliia Bolhova  
(signature) (full name)

Review of the work program (attached) provided: Sereda Olga   
(Full name)

Koshel Elena   
(Full name)

Methodologist of the Department of Educational Quality,

licensing and accreditation  (Baranik Nadiya \_\_\_\_\_)  
(signature) (Full name)

Registered in the electronic database: date: 25.07 2024 year

SNAU, 2024 year

Information on reviewing the work 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

1.	Name MC	Modeling and planning a scientific experiment							
2.	Faculty/department	Food Technology Department, Technologies of Nutrition Department							
3.	Status MC	Mandatory							
4.	Program/Specialty(s) that include MC for	Educational and scientific program: Food technologies/ specialty: 181 "Food technologies"							
5.	MC maybe proposed for	EPP Food Technologies for Master's degree specialty 181 Food Technologies							
6.	NQF level	Level 8							
7.	Semester and duration Study	Third semester Duration of study – 1 semester							
8.	Number of ECTS credits	3 credits							
9.	Total hours and their distribution	Contact work (classes)					Independent work		
		Lectures		Practical /seminar		Laboratory			
		Daily	Correspondence.	Daily	Correspondence.	Daily	Correspondence.	Daily	Correspondence.
		20		20	-	-		50	
10.	Language of instruction	Ukrainian/English							
11.	Teacher / Coordinator educational component	Mazurenko Igor Kostiantynovych							
11.1	Contact information	Department auditorium 112m, building №4. Tel. 067-706-76-62, E-mail:0487222489@ukr.net							
12.	General description educational component	To familiarize postgraduate students with science as a system of knowledge, forms of its organization and management, the system of training scientific personnel in Ukraine; to give an idea of the methodology of scientific research as a toolkit and as a science of their methods and areas application in scientific activity; to reveal the meaning and essence of information support for scientific activity; to introduce the organizational principles of scientific research; to give an idea of the stages of organizational and methodological preparation of scientific research; to introduce the methodology of experimental research and mathematical planning of the experiment; to reveal the role and principles of scientific organization of work in scientific activity.							
13.	The purpose of education component	Formation of a scientific worldview in postgraduate students, a holistic understanding of the methodology of scientific research and skills in the practical application of specific methods of scientific research in professional activities, study of the principles and methods of management and implementation of scientific research, organization of the researcher's work, ethics and morality of science; acquisition of practical skills in organizing research, publishing and implementing research results.							
14.	Prerequisites for studying MC, connection with other educational components of the ESP	“Modern achievements of food science”, “Methodology of conducting scientific research”							
15.	Academic policy virtue	If copying is discovered during the exam, the applicant's work is canceled and resubmitted.							
16.	Link to the course in Moodle system	<a href="https://cdn.snau.edu.ua/moodle/course/view.php?id=5891">https://cdn.snau.edu.ua/moodle/course/view.php?id=5891</a>							

## 2. LEARNING OUTCOMES BY EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

Learning outcomes in the discipline <sup>1</sup>	Program learning outcomes <sup>2</sup>				How is PLO evaluated?
	2	3	4	5	
<u>DLO 1.</u> Formulate and test hypotheses; use appropriate evidence to substantiate conclusions, in particular, the results of theoretical analysis, experimental studies and mathematical and/or computer modeling, and available literature data.	+				<i>Knowledge assessment by checking the processing of the basic lecture notes and practical class reports</i>  <i>Test</i>  <i>Individual task</i>
<u>DLO 2.</u> Use modern tools and technologies for searching, processing and analyzing information on food technology issues, in particular, statistical methods for analyzing large- scale and/or complex data, specialized databases and information systems.		+			
<u>DLO 3.</u> Plan, organize and carry out experimental and/or theoretical research in the field of food technology using modern tools and equipment, information technology and software.			+		
<u>DLO4.</u> Have advanced conceptual and methodological knowledge, demonstrate research skills in the field of food technology and at the border of subject areas, sufficient to conduct scientific and applied research in order to obtain new knowledge and/or implement innovations at the level of modern world achievements in science and technology.				+	

<sup>1</sup>The list that is given in the work program under "to know, to be able to".

When defining the DRL in the work program, you can not highlight "know, be able to", but give a general list.

<sup>2</sup>indicate the PRN numbers as they are given in the OP.

MANDATORY! The PNRs listed in the appendix must match the "+" ones listed in the PNR and OK correspondence matrix of the educational program.

### 3. CONTENT OF THE EDUCATIONAL COMPONENT (COURSE PROGRAM)

Topic. List of questions, what will be considered within the topic	Distribution within the overall time budget			Recommended literature <sup>5</sup>
	Classroom work		Independ- ent work	
	L	Pr		
<b>Topic 1.</b> Introduction. Scientific foundations of the formation of fundamental and applied research.	2	-	5	[1,2,5,6]
<b>Topic 2.</b> Information and literary sources as a basic component of scientific research. <i>Software. Formation of research direction. Defining the overall research objective. Formation of research goals and objectives. Working with special literary and information sources.</i>	2	4	5	[4,8,15]
<b>Topic 3.</b> Maintained regulatory documents, methods and procedures for conducting the experiment.	2	-	5	[9,10]
<b>Topic 4.</b> Laboratory equipment and instruments. Determination of functional purpose and possibilities of application in scientific research. <i>Software. Main stages of research. Creating a research work program. Creating a research diary. Conducting cross-tests based on the principle of research in laboratory and industrial conditions.</i>	2	4	5	[11,12]
<b>Topic 5.</b> Formation of a roadmap for scientific research.	2	-	5	[12,14,15]
<b>Topic 6.</b> Organization of a scientific experiment based on the principle of modeling conditions as close as possible to industrial ones. <i>Software. Technology of ZRG products using dietary supplements, non-traditional raw materials and creative trends.</i>	2	4	5	[2,10,11]
<b>Topic 7.</b> Formation of a food product based on the principle of adjusting production processes and the chemical composition of the starting raw materials	2	-	5	[3,5,11]
<b>Topic 8.</b> Modeling a recipe bookmark to improve the quality, safety, and functionality of a food product. <i>Software. Research into the influence of physicochemical processes on the formation of food quality and safety. Formation of the structure of solutions based on the principle of modeling and adjusting production processes. Formation of sensory and functional indicators of the product based on the principle of modeling the physicochemical composition of the starting raw materials.</i>	2	4	5	[11,13,17,18]
<b>Topic 9.</b> Mathematical modeling, processing of scientific experiment results.	2	-	5	[9,16]
<b>Topic 10.</b> Fundamentals of substantiating scientific results. Preparation of a general report on scientific research. <i>Software. Drawing conclusions from research results. Substantiation of research results using the principles of</i>	2	4	5	

<i>mathematical calculations and modeling. Formation of general conclusions. Formatting research results according to the structure.</i>				
<b>Total</b>	<b>20</b>	<b>20</b>	<b>50</b>	

#### 4. TEACHING AND LEARNING METHODS

DRN	Teaching methods (work that will be carried out by the teacher during classroom lessons, consultations)	Number of hours	Teaching methods (what types of learning activities should the student perform independently)	Keel-hours
<u>DRN 1.</u> Formulate and test scientific hypotheses; apply sound evidence to support conclusions, including the results of theoretical calculations, experimental studies, mathematical or computer modeling, and data from scientific sources.	Lecture session (teaching lecture material, conversation, demonstration of graphic material)	10	Familiarization with lecture material, preparation of a basic lecture outline. Presentation of decisions made and preparation of abstracts and reports.	12
<u>DRN 2.</u> Apply modern tools and technologies to search, process and analyze information on current issues of food technology, in particular statistical methods for processing large arrays and/or structurally complex data, as well as specialized databases and professional information systems.	Lecture session (teaching lecture material, conversation, demonstration of graphic material). Practical lesson (solving assigned tasks).	10	Familiarization with lecture material, preparation of a basic lecture outline. Presentation of decisions made and preparation of abstracts and reports. Presentation of the results of practical classes, preparation of reports.	12
<u>DRN 3.</u> Plan, organize and carry out experimental and/or theoretical research in the field of food technology using modern tools and equipment, information technology and software.	Practical lesson (solving assigned tasks).	10	Presentation of the results of practical classes, preparation of reports.	12
<u>DRN4.</u> Have advanced conceptual and methodological knowledge, demonstrate research skills in the field of food technology and at the border of subject areas, sufficient to conduct scientific and applied research in order to obtain new knowledge and/or implement innovations	Practical lesson (solving assigned tasks).	10	Presentation of the results of practical classes, preparation of reports.	14

at the level of modern world achievements in science and technology.				
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## 5. EVALUATION BY EDUCATIONAL COMPONENT

### 5.1. Summative assessment

5.1.1. To assess the expected learning outcomes, there are

No.	Summative assessment methods	Points / Weight in the overall score	Date of compilation
	Module 1 (50 points)		
1.	Written test on theoretical material	25 points / 25%	By the end of week 8
2.	Execution and defense of practical works	25 points / 25%	By the end of week 8
	Module 2 (50 points)		
3.	Written test on theoretical material	25 points / 25%	By the end of week 14
4.	Execution and defense of practical works	25 points / 25%	By the end of week 14
5.	Test – oral interview	60-100 points	By the end of week 15

5.1.2. Evaluation criteria

Component <sup>8</sup>	Unsatisfactorily	Satisfactorily	Good	Excellent <sup>9</sup>
Written assignment on theoretical material	<15 points	16-19 points	20-24 points	25 points
	Task requirements not met	Answers to all questions are provided, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question.	The answers to all questions are given	In response to all questions, creativity, thoughtfulness, and an original solution to the problem were demonstrated.
Execution and defense of practical works	<15 points	16-19 points	20-24 points	25 points
	Task requirements not met	Answers to all questions are provided, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other	The answers to all questions are given	All task requirements were met, creativity and thoughtfulness were demonstrated, and an original solution to the problem was proposed.

		approaches to the question.		
Test – oral interview	<59 points	60-74 points	75-89 points	90-100 points
	Task requirements not met	Answers to all questions are provided, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question.	The answers to all questions are given	All task requirements were met, creativity and thoughtfulness were demonstrated, and an original solution to the problem was proposed.

## 5.2. Formative assessment:

To assess current progress in learning and understand areas for further improvement,

No.	Elements of formative assessment	Date
<i>Fall semester</i>		
1.	Oral knowledge test after studying topics 1-5	Week 7
2.	Oral knowledge test after studying topics 6-10	14 week
3.	Oral questioning during practical work	Within 1-14 weeks
4.	Feedback from the teacher during preparation for the test	14 week

## 6. PRINTED AND INTERNET SOURCES

### 6.1. Basic literature:

1. Modeliuvannia ta planuvannia naukovooho eksperymentu: Konspekt lektzii dlia zdobuvachiv spetsialnosti «Kharchovi tekhnolohii», ONP «Kharchovi tekhnolohii», stupenia vyshchoi osvity «Doktor filosofii» / uklad. I.K. Mazurenko, O.Yu. Melnyk – Sumy, 2025. – 94 s.
2. Modeliuvannia ta planuvannia naukovooho eksperymentu: Metodychni vkazivky shchodo provedennia laboratornykh zaniat dlia zdobuvachiv spetsialnosti «Kharchovi tekhnolohii», ONP «Kharchovi tekhnolohii», stupenia vyshchoi osvity «Doktor filosofii» / uklad. I.K. Mazurenko, O.Yu. Melnyk – Sumy, 2025. – 34 s.
3. Modeliuvannia ta planuvannia naukovooho eksperymentu: Metodychni vkazivky shchodo provedennia samostiinoi roboty dlia zdobuvachiv spetsialnosti «Kharchovi tekhnolohii», ONP «Kharchovi tekhnolohii», stupenia vyshchoi osvity «Doktor filosofii» / uklad. I.K. Mazurenko, O.Yu. Melnyk – Sumy, 2025. – 77 s.
4. Metodolohiia naukovykh doslidzhen: navchalnyi posibnyk dlia studentiv i aspirantiv spetsialnosti 181 «Kharchovi tekhnolohii». Ladyka V.I., Shylman L.Z., Pertsevoi F.V. ta in.; za zah. redaktsiieiu Ladyky V.I. Kherson: OLDI-PLIuS, 2022. 222 s.
5. Suchasni dosiahnennia kharchovoi nauky: navchalnyi posibnyk dlia studentiv i aspirantiv spetsialnosti 181 «Kharchovi tekhnolohii»: U 2-kh ch. Ch. 2 / Ladyka V.I., Shylman L.Z., Pertsevoi F.V. ta in.; za zah. redaktsiieiu Ladyky V.I. Kherson: Oldi+, 2022. 352 s.
6. Innovatsii u kharchovii haluzi Ch 1: navchalnyi posibnyk dlia vypusknnykiv osvitnoho stupenia «Doktor filosofii» spetsialnosti 181 «Kharchovi tekhnolohii» / Melnyk O.Yu., Savchenko-Pererva M.Yu., Stepanova T.M. ta in. Pid zah. redaktsiieiu Melnyk O.Yu. // Sumy: SNAU, 2023 – 226 s., protokol № 9 vid «29» sichnia 2024 r.

7. Sachko A.V., Diichuk V.V., Vorobets M.M., Sema O.V. Instrumentalni metody analizu kharchovoi produktsii: navch.- metod. posibnyk. Chernivtsi: ChNU im. Yurii Fedkovycha, 2020 – 80 s.
8. Prishchenko O. P., Chernogor T. T. Construction of statistical models of chemical and technological objects on the basis of a complete factor experiment // *Eastern-European Journal of Enterprise Technologies*. 2020. № 3/6 (105). P. 6–14. DOI: <https://doi.org/10.15587/1729-4061.2020.206455>
9. Ares G., Jaeger S. R., Antúnez L., Vidal L., Giménez A. Design of experiments and regression modelling in food flavour and sensory analysis: A review // *Trends in Food Science & Technology*. 2018. Vol. 71. P. 1–14. DOI: <https://doi.org/10.1016/j.tifs.2017.11.013>
10. Brovelli V., Cattaneo C., Limbo S. (eds.) Experimental Designs for Mixture in the Food Sector : Special Issue // *Foods*. 2023. Vol. 12. URL: [https://www.mdpi.com/journal/foods/special\\_issues/Experimental\\_Designs](https://www.mdpi.com/journal/foods/special_issues/Experimental_Designs)
11. Granato D., Ares G. (eds.) Modeling of Food Systems and Design of Experiments: Special Issue // *Foods*. 2022. Vol. 11. URL: [https://www.mdpi.com/journal/foods/special\\_issues/models\\_designs](https://www.mdpi.com/journal/foods/special_issues/models_designs) (дата звернення:
12. Experimental Design and Programming Solutions for Food Engineering // *ResearchGate*. 2021. URL: [https://www.researchgate.net/publication/354834534\\_Experimental\\_Design\\_and\\_Programming\\_Solutions\\_for\\_Food\\_Engineering](https://www.researchgate.net/publication/354834534_Experimental_Design_and_Programming_Solutions_for_Food_Engineering)
13. Mathematical treatment of experimental research of manufacturing triticales flakes according to multi-factor experiment method // *AGRIS FAO Database*. 2023. URL: <https://agris.fao.org/search/en/providers/124432/records/685187ff53e52c13fc772895>

## 6.2. Additional literature:

1. Mazurenko I., Shao Zhengzheng, Yangui Xie The plant raw materials and medicinal plants for children’s functional foods, safety studies, Збірник наукових праць Tavrichesky State agrotechnological University named after Dmitry Motorny. Issue 23, Tom. 1. 2021, pp. 39-46.
2. Guang-Hui Liu, Jing-Chao Fan, Zhuang-Li Kang, Igor Mazurenko Combined effects of high-pressure processing and pre-emulsified sesame oil incorporation on physical, chemical, and functional properties of reduced-fat pork batters *Current Research in Food Science* Volume 5, 2022, Pages 1084-1090
3. Zhao, Y.; Wang, Y.; Li, K.; Mazurenko, I. Effect of Oudemansiella raphanioides Powder on Physicochemical and Textural Properties, Water Distribution and Protein Conformation of Lower-Fat Pork Meat Batter. *Foods* 2022, 11, 2623.
4. Burdo, O., Bezbakh, I., Zykov, A., Fatieieva, Y., Pour, D. R., Osadchuk, P., Mazurenko, I., Zhengzheng Shao, Philipova, L. (2021). Development of the design and determination of mode characteristics of block cryoconcentrators for pomegranate juice . *Eastern-European Journal of Enterprise Technologies*, 2(11 (110), 6–14. <https://doi.org/10.15587/1729-4061.2021.230182>
5. Yunbo Li, Xiaoling Liu, Haoyu Zhou, Bo Li, Igor Mazurenko. Inhibitory Mechanism of Engeletin Against  $\alpha$ -Glucosidase. *Natural Product Communications*. 2021. vol 16, № 1. стр. 1-5. Citation Scopus & Science Citation Index (Web of science).