

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
SUMY NATIONAL AGRARIAN UNIVERSITY

Department *milk and meat technologies*  
(name of the department)

"Approved"

Head of Department  
S.D. Melnychuk

  
«25» 06 2020 y.

CURRICULUM WORKING PROGRAM (SILABUS)

*EC8 Scientific research work*

**Specialty:** 181 "Food Technology"

**Educational program:** Food Technology

**Faculty:** Food Technology

2020 – 2021 academic year

Work program on discipline "Scientific research work" for students majoring of specialty in 181 "Food Technology".

Developers:

Samilyk M.M., Department of Milk and Meat Technology, Ph.D. (M. Samilyk)  
last name, initials signature

The work program was approved at the meeting of the department Milk and Meat Technology

Protocol from "25" 06 2020 year № 17

Head of Department (S.D. Melnychuk)  
(signature) (last name, initials)

Agreed:

Guarantor of the educational program Pertsevov F.V. (F.V. Pertsevov)

Dean of the Faculty Radchuk O.V. (O.V. Radchuk)

Methodist of the Department of Education Quality, licensing and accreditation (S.D. Melnychuk)

Registered in the electronic database: date: 20 of 2020 y.

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1. Description of the discipline

Name of indicators	Branch of knowledge, direction of training, educational and qualification level	Characteristics of the discipline	
		full-time education	external form of education
Number of credits – 10	Field Branch of knowledge: (code and name) - 18 "Production and technology"	<i>Normative</i>	
Modules – 2	Specialty: 181 "Food Technology"	<b>Year of preparation:</b> 2020-2021	
Content modules: 4		<b>Course</b>	
Individual research task: <i>Substantiation of the prescription composition and technological parameters of the process of production of new food products</i>		1	
Total number of hours - 300		<b>Semester</b>	
		1, 2	
		<b>Lectures</b>	
		30 hours	
		<b>Practical, seminars</b>	
		106 hours	
		<b>Laboratory</b>	
		-	
		<b>Independent work</b>	
Weekly hours for full-time study: classroom - independent student work -	Master	164 hours	
		<b>Individual tasks: 10 hours</b>	
		<b>Type of control:</b>	
		Exam	Exam

## 1. The purpose and objectives of the discipline

**The purpose:** to study the methodological and organizational principles of research activities, which will contribute to a comprehensive and reliable conduct of research and their testing.

**Objectives:** to acquire research skills, solve the complex problems in food technology in professional activities and in the learning process, which involves research, innovations and is characterized by uncertainty of conditions and requirements.

*As a result of studying the discipline the student must:*

### **know:**

1. Methods of finding, processing and analyzing information from various sources.
2. Research methods at the appropriate level.
3. Fundamentals of planning and implementation of scientific research using modern equipment, methods and specialized software in the conditions of training, research and/or production laboratories.
4. Mathematical methods and models in applied research, ways to optimize technological processes for the development of innovative technological solutions in food production.
5. Principles of development of new generation food products, including functional ones, based on the principles of food combinatorics and application of safe, biologically complete raw materials and innovative ingredients.
6. Methods of interpretation of the received data, requirements to registration of scientific reports, preparation of scientific publications, presentations.
7. Methods of presenting research and design decisions, including in a foreign language, at scientific seminars and conferences on food technology development.

### **be able:**

1. To generate new ideas, show initiative and ingenuity in conducting research.
2. To find, systematize and analyze the necessary information in the scientific and technical literature, electronic databases and other sources of information at the stage of choosing a problem or research topic.
3. To demonstrate initiative and ingenuity in the development and implementation of technical and technological innovations. Be able to independently make non-standard creative decisions, take responsibility for them, generate new ideas and implement them in practice, demonstrate the ability to adapt.
4. To apply special equipment, modern software, methods and techniques that are acceptable in certain areas of food technology, when performing research in training, research and production laboratories.
5. To choose and apply the most suitable methods of mathematical modeling and optimization in the development of scientific and technical projects in the field of food technology.

6. To plan and manage innovative scientific projects of fundamental and applied direction taking into account the current state of science and technology in food technology, to conduct research, analyze the results and draw conclusions.
7. To analyze and take into account in practice the trends of scientific and technical development of food science, choose the most promising and rational areas of scientific and technical activities.
8. To develop and improve technologies of food production, to design the composition of food products, to develop technologies of storage and canning of semi-finished products and finished products.
9. To objectively and critically evaluate vital social information, make a significant contribution to the harmonization of human relations, work effectively, both individually and as a team.
10. To develop and implement innovative technological solutions to solve existing problems and further development of food technology, reproduce the results of research and testing in the production environment of real enterprises, develop foreign economic relations of food industry and restaurants.

2. **The program of the discipline**  
(SNAU Academic Council from \_\_\_\_\_ protocol № )

**Content module 1. Methodology and organization of scientific research**

**Topic 1. General information about science and research**

1. Basic definitions and concepts of scientific research.
2. Choice of direction and formation of research topics.
3. Classification and main stages of research.

**Topic 2. Research principles of science**

1. Features of scientific knowledge.
2. Principles and methods of scientific knowledge.
3. Levels of research methods.

**Topic 3. Methods of scientific research**

1. Research planning.
2. Study and analysis of literature sources on the topic of research.
3. Defining the object, subject and the purpose of scientific research.

**Content module 2. Conducting research**

**Topic 4. Fundamentals of theoretical research**

1. The composition of scientific work.
2. Search, accumulation and processing of scientific information.
3. Tasks and structure of theoretical research.

**Topic 5. Fundamentals of experimental research**

1. The essence of the experiment, the general requirements for conducting.
2. The classification of experiments.
3. Stages of preparation of a scientific experiment.
4. Classical methods of planning experimental research.
5. Computer technology and tools in research.

**Topic 6. Experiment planning and analysis of its results**

1. Work planning and workplace organization.
2. The formulation of the experimental research structure.
3. The registration of experimental research results.

**Content module 3. Preparation of scientific publications and patents**

**Topic 7. Preparation of materials and abstracts**

1. Defining the topic, purpose and objectives of the study.
2. The choice of materials and methods.
3. Coverage of results and conclusions.

**Topic 8. Preparation of a scientific article**

1. Defining the topic, purpose and objectives of the study.
2. The choice of materials and methods.
3. The coverage of results and conclusions.
4. Requirements for bibliographic description.

**Topic 9. Preparation of the patent of Ukraine**

1. Description of a utility model (invention).
2. Abstract.
3. The formula of the utility model.

**Content module 4. Master's thesis as a qualifying study**

**Topic 10. Organizational arrangements for the master's thesis**

1. Formation of the research topic and substantiation of its relevance.
2. The main stages of the master's thesis
3. The structure of the master's thesis
4. Requirements for the master's thesis.

**Topic 11. Practical recommendations for writing individual sections of the master's thesis**

1. Analytical review of the literature.
2. Organization, object, subjects and methods of research.
3. Substantiation of the content of the investigated additive / recipe of a new product / parameters of the technological process of food production.
4. Improvement / development of food technology / study of quality indicators of new food products.
5. Analysis of technology and identification of dangerous factors of food production.
6. Analysis and generalization of the results of economic research. Practical implementation of scientific development.

4. **The structure of the discipline**

Names of content modules and topics	Number hours											
	full-time						external form					
	total	including					total	including				
l		p	se	ind	i.w	l		p	se	ind	i.w	
1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Module 1</b>												
<b>Content module 1. Methodology and organization of scientific research</b>												
<b>Topic 1. General information about science and research</b>	28	2	6			20						
<b>Topic 2. Research principles of science</b>	28	2	6			20						
<b>Topic 3. Methods of scientific research</b>	36	2	12	2		20						
<b>Total for the content module 1</b>	92	6	24	2		60						
<b>Content module 2. Conducting research</b>												
<b>Topic 4. Fundamentals of theoretical research</b>	34	2	12			20						
<b>Topic 5. Fundamentals of experimental research</b>	40	4	12			20						
<b>Topic 6. Experiment planning and analysis of its results</b>	50	2	22	4		20						
<b>Total for the content module 2</b>	118	8	46	4		60						
<b>Module 2</b>												
<b>Content module 3 Preparation of scientific publications and patents</b>												

<b>Topic 7. Preparation of materials and abstracts</b>	14	2	2				10							
<b>Topic 8. Preparation of a scientific article</b>	20	4	6				10							
<b>Topic 9. Preparation of the patent of Ukraine</b>	18	2	4	2			10							
<b>Total for the content module 3</b>	<b>52</b>	<b>8</b>	<b>12</b>	<b>2</b>			<b>30</b>							
<b>Content module 4 Master's thesis as a qualifying study</b>														
<b>Topic 10. Organizational arrangements for the master's thesis</b>	9	2	2				5							
<b>Topic 11. Practical recommendations for writing individual sections of the master's thesis</b>	29	6	2	2	10	9								
<b>Total for the content module 4</b>	<b>38</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>10</b>	<b>44</b>								
<b>Total hours</b>	<b>300</b>	<b>30</b>	<b>86</b>	<b>10</b>	<b>10</b>	<b>164</b>								

### 5. Topics and plan of lectures

№	Topic name and plan	Number hours
<i>Autumn semester</i>		
1	<b>Topic 1. General information about science and research</b> <b>Plan.</b> 1. Basic definitions and concepts of scientific research. 2. Choice of direction and formation of research topic. 3. Classification and main stages of research.	2
2	<b>Topic 2 Research principles of science</b> <b>Plan.</b> 1. Features of scientific knowledge. 2. Principles and methods of scientific knowledge. 3. Levels of research methods	2
3	<b>Topic 3. Methods of scientific research</b> <b>Plan.</b> 1. Research planning. 2. Study and analysis of literature sources on the topic of research. 3. Defining the object, subject and the purpose of scientific research.	2
4	<b>Topic 4. Fundamentals of theoretical research</b> <b>Plan.</b> 1. The composition of scientific work. 2. Search, accumulation and processing of scientific information. 3. Tasks and structure of theoretical research.	2
5	<b>Topic 5. Fundamentals of experimental research</b> <b>Plan.</b> 1. The essence of the experiment, the general requirements for conducting. 2. The classification of experiments. 3. Stages of preparation of a scientific experiment. 4. Classical methods of planning experimental research. 5. Computer technology and tools in research.	4
6	<b>Topic 6. Experiment planning and analysis of its results</b> <b>Plan.</b>	2

	1. Work planning and workplace organization. 2. The formulation of the structure of experimental research. 3. The registration of experimental research results.	
	<b>Total per the fall semester</b>	<b>14</b>
<i>Spring semester</i>		
7	<b>Topic 7. Preparation of materials and abstracts</b> <b>Plan.</b> 1. Defining the topic, purpose and objectives of the study. 2. Choice of materials and methods. 3. Coverage of results and conclusions.	2
8	<b>Topic 8. Preparation of a scientific article</b> <b>Plan.</b> 1. Defining the topic, purpose and objectives of the study. 2. The choice of materials and methods. 3. The coverage of results and conclusions. 4. Requirements for bibliographic description.	4
9	<b>Topic 9. Preparation of the patent of Ukraine</b> <b>Plan.</b> 1. Description of a utility model (invention). 2. Abstract. 3. The formula of the utility model.	2
10	<b>Topic 10. Organizational arrangements for the master's thesis</b> <b>Plan.</b> 1. Formation of the research topic and substantiation of its relevance. 2. The main stages of the master's thesis 3. The structure of the master's thesis 4. Requirements for the master's thesis.	2
11	<b>Topic 11. Practical recommendations for writing individual sections of the master's thesis</b> <b>Plan.</b> 1. Analytical review of the literature. 2. Organization, object, subjects and methods of research. 3. Substantiation of the content of the investigated additive / recipe of a new product / parameters of the technological process of food production. 4. Improvement / development of food technology / study of quality indicators of new food products. 5. Analysis of technology and identification of dangerous factors of food production. 6. Analysis and generalization of the results of economic research. Practical implementation of scientific development.	6
	<b>Total per the spring semester</b>	<b>16</b>
	<b>Total</b>	<b>30</b>

### 6. Topics of seminars

№	Name topics	Number hours
<i>Autumn semester</i>		
1	Analysis of literature sources on the topic of research	2
2	Presentation of the experimental research results	4
	<b>Total per semester</b>	<b>6</b>
<i>Spring semester</i>		

3	Submission of a utility model patent	2
4	Practical implementation of scientific development	2
	<b>Total per semester</b>	<b>4</b>
	<b>Total</b>	<b>10</b>

## 6. Topics of practical classes

№	Name topics	Number hours
<i>Autumn semester</i>		
1	<b>Practical lesson № 1.</b> The process of formulating the problem and that directly to the scientific dosage	6
2	<b>Practical lesson № 2.</b> Formation of stages of scientific theoretical dosage	6
3	<b>Practical lesson № 3.</b> Conducting an empirical dosage	12
4	<b>Practical lesson № 4.</b> The stagnation of scientific methods of knowledge in theoretical knowledge	12
5	<b>Practical lesson № 5.</b> The stagnation of scientific methods in the knowledge of experimental studies	12
6	<b>Practical lesson № 6.</b> Conducting an experiment and an analysis of its results	22
	<b>Total per semester</b>	<b>70</b>
<i>Spring semester</i>		
7	<b>Practical lesson № 7.</b> Підготовка матеріалів та тез доповідей за результатами експерименту	2
8	<b>Practical lesson № 8.</b> Preparation of scientific statistics for the results of the experiment	6
9	<b>Practical lesson № 9.</b> Preparation of a patent of Ukraine for the results of the experiment	4
10	<b>Practical lesson № 10.</b> Formation of the scheme	2
11	<b>Practical lesson № 11.</b> Substantiation of the content of the investigated additive / formulation of a new product / parameters of the technological process of food production	2
	<b>Total per semester</b>	<b>16</b>
	<b>Total</b>	<b>86</b>

## 6. Independent work

№ з/п	Topic title and list of questions	Number hours
<i>Autumn semester</i>		
1	<b>Topic 1.</b> <i>General information about science and research</i> 1. Sequence and stages of scientific research 2. Economic justification for choosing a scientific topic 3. Search, accumulation and processing of scientific information	20
2	<b>Topic 2.</b> <i>Research principles of science</i> 1. Historical preconditions for the formation of the principles of scientific knowledge 2. Phases of origin and sequence of development of any branch of science 3. The scientific revolution in science and its functions	20
3	<b>Topic 3.</b> <i>Methods of scientific research</i>	20

	1. Modern methods of theoretical research 2. Discrete and continuous random variables 3. General scheme of the Monte Carlo method	
4	<b>Topic 4.</b> <i>Fundamentals of theoretical research</i> 1. The use of computers in theoretical research 2. System approach, its place and role in scientific knowledge 3. The essence of systems analysis and its subject	20
5	<b>Topic 5.</b> <i>Fundamentals of experimental research</i> 1. The essence and features of scientific thinking 2. Knowledge management. Intellectual capital 3. Problem situations within scientific research	20
6	<b>Topic 6.</b> <i>Experiment planning and analysis of its results</i> 1. Classification of experiments 2. Classical methods of planning experimental research 3. Approximation of experimental research results	20
	<b>Total per semester</b>	<b>120</b>
<i>Spring semester</i>		
7	<b>Topic 7.</b> <i>Preparation of materials and abstracts</i> 1. Ways to find optimal solutions during the preparation of abstracts 2. Technology of scientific activity 3. Preparation of reports on the results of scientific work	10
8	<b>Topic 8.</b> <i>Preparation of a scientific article</i> 1. International scientometric bases 2. Basic scientometric indicators 3. Organization of creative activity of the researcher	10
9	<b>Topic 9.</b> <i>Preparation of the patent of Ukraine</i> 1. Ukrainian Institute of Intellectual Property 2. Patent database of Ukraine 3. Legislative acts of Ukraine	10
10	<b>Topic 10.</b> <i>Організаційні заходи щодо виконання магістерської роботи</i> 1. Technology of master's thesis preparation 2. Psychology of scientific creativity	5
11	<b>Topic 11.</b> <i>Practical recommendations for writing individual sections of the master's thesis</i> 1. Organoleptic evaluation of product quality by scoring 2. The purpose of modeling the technological system 3. Testing the technology of a new dish 4. Development of hardware and technological scheme of food production 5. Analysis of technology and identification of dangerous factors of food production 6. Economic and social justification for the introduction of innovative products into production	9
	<b>Total per semester</b>	<b>44</b>
	<b>Total</b>	<b>164</b>

## 7. Individual tasks

№ з/п	Topic title and list of questions	Number hours
<i>Spring semester</i>		
1	<b>Topic 11.</b> <i>Practical recommendations for writing individual sections of the master's thesis</i>	10

1. Substantiation of the prescription composition and technological parameters of the process of production of new food products
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## 8. Teaching methods

### 1. Methods of teaching by source of knowledge:

1.1. *Verbal*: story, explanation, lecture, instruction, work with the book (reading, translation, writing, drawing up a plan, reviewing, taking notes, making tables, graphs, reference notes, etc.).

1.2. *Visual*: demonstration, illustration, observation.

1.3. *Practical*: laboratory method, practical work, production and practical methods.

### 2. Teaching methods by the nature of the logic of cognition.

2.1. *Analytical*.

2.2. *Methods of synthesis*.

2.3. *Inductive method*.

2.4. *Deductive method*.

### 3. Teaching methods by the nature and level of independent mental activity of students.

3.1. *Problematic*

3.2. *Partial search (heuristic)*

3.3. *Research*

3.4. *Reproductive*.

3.5. *Explanatory and demonstrative*

4. **Active teaching methods (for example)**- use of technical teaching aids, brainstorming, debates, round tables, use of problem situations, group research, self-assessment of knowledge, simulation teaching methods (based on simulation of future professional activity), use of training and control tests, use of reference lectures and others)

5. **Interactive learning technologies (for example)** - use of multimedia technologies, interactive whiteboards and spreadsheets, case-study (method of analysis of specific situations), dialogue training, cooperation of students (cooperation) and others.

## 11. Control methods

1. Rating control according to the 100-point scale of ECTS assessment

2. Carrying out intermediate control during the semester (intermediate certification)

3. Polycriteria assessment of students current work:

- the level of knowledge demonstrated in practical and seminar classes;
- results of performance and the defense of practical works;
- performance of an individual task;
- test results;
- production situations, cases, etc.

4. Direct consideration in the final assessment of the student's performance of a particular individual task:

- educational and practical research with presentation of results, etc.

## 12. Distribution of the points that students receive on the exam

Current testing and independent work											I W S	Total per modules and IWS	Cert ifica tion	The result th test - exam	Sum
Content module 1 8 points			Content module 2 8 points			Content module 3 – 12 points			Content module 4 - 12 points						
T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11		55	15	30	100
2	2	4	2	2	4	2	4	6	2	10	15	(40+15)			

## Assessment scale: national and ECTS

The sum of points for all types of educational activities	Rating ECTS	Rating on a national scale	
		for exam, course project (work), practice	for credit
90 – 100	A	perfectly	credited
82-89	B	fine	
75-81	C		
69-74	D		
60-68	E	satisfactorily	not credited with the possibility of re- assembly
35-59	FX	unsatisfactory with the possibility of reassembly	
1-34	F	unsatisfactory with mandatory re- study of the discipline	not credited with compulsory re-study of the discipline

## 13. Methodical support

1. Master's thesis. Textbook for students majoring in 181 "Food Technology" (specialization "Food Technology") full-time education // Sumy: SNAU, 2017, 128 p.

## 14. Recommended literature

### Basic

1. Адаменко М. І. Основи наукових досліджень / М. І. Адаменко, М. В. Бейлін. – Х. : ХНУ імені В. Н. Каразіна, 2014. – 188 с.
2. Актуальні питання методології та практики науково-технічної політики / за ред. Б. А. Малицького. – К. : УкрІНТЕІ, 2001. – 201 с.
3. Артемчук Г. І., Курило В. М., Кочерган М. П. Методика організації науково-дослідної роботи: навч. посіб. для студ. та викл. ВНЗ / Київ. держ. лінгв. ун-т. – К. : Форум, 2000. – 270 с.
4. Білуха М. Т. Методологія наукових досліджень: підруч. Для бакалаврів, магістрів і аспірантів екон. спец. ВНЗ – К. : АБУ, 2002. – 480 с.

6. Бобилев В. П., Іванов І. І., Проїдак Ю. С. Методологія та організація наукових досліджень: Навчальний посібник. – Дніпропетровськ : Системні технології, 2008. – 264 с.
7. Грищенко У. М., Грищенко О. А., Борисенко В. А. Основи наукових досліджень: Навч. пос. – К., 2001. – 346 с.
8. Гуменна О. А. Основи наукових досліджень. – Суми: СумДПУ ім. А. С. Макаренка, 2007. – 99 с.
17. Гуменюк І. Л. Алгоритм наукового дослідження / І. Л. Гуменюк, С. М. Коваленко. – Суми : СумДПУ ім. А. С. Макаренка, 2008. – 46 с

#### *Auxiliary*

1. «Про вищу освіту»: Закон України № 2984 – III від 17.01. 2002 р. (із змінами і доповненнями) // Відомості Верховної Ради України. – 2010. – № 9.
2. «Про інформацію»: Закон України від 23.06.2005 // Відомості Верховної Ради України. – 2005 – №1 .
3. «Про наукову і науково-технічну діяльність»: Закон України від 13 грудня 1991 р. // Відомості Верховної Ради України. – 1992. – № 12.
4. «Про наукову і науково-технічну експертизу»: Закон України від 10.02.1995 (станом на 09.02.2006) // Відомості Верховної Ради України. – № 2.

#### **15. Information resources**

**Коментар:** *Формат РНП - А5.*