



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ  
ФЕДЕРАЦИИ

Федеральное государственное автономное образовательное учреждение  
высшего образования

Дальневосточный федеральный университет  
(ДВФУ)

**ШКОЛА БИОМЕДИЦИНЫ**

«СОГЛАСОВАНО»

Руководитель ОП

Каленик Т.К.  
(подпись) (Ф.И.О. рук. ОП)

«12» июля 2018 г.

«УТВЕРЖДАЮ»

Директор Департамента  
пищевых наук и технологий

Ю.В. Приходько  
(подпись) (Ф.И.О.)

«12» июля 2018 г.

**УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС ДИСЦИПЛИНЫ**

«Modern manufacturing technologies for the manufacture and storage of food / Современные  
производственные технологии изготовления и хранения пищевой продукции»

Направление подготовки 19.04.01 Биотехнология

Магистерская программа «Agri-Food Biotechnology»

Форма подготовки очная

Школа биомедицины

Департамент пищевых наук и технологий

Курс 2, семестр 3

Лекции – 18 час.

Практические занятия – 36 час.

Лабораторные работы – – час.

Самостоятельная работа – 36 час.

Контроль самостоятельной работы 54 час.

в том числе на подготовку к экзамену \_\_\_\_\_ час.

Всего часов – 144 час.

Всего часов аудиторной нагрузки – 36 час.

Зачет – – семестр

Экзамен 3 семестр

Учебно-методический комплекс составлен в соответствии с требованиями образовательного стандарта, самостоятельно устанавливаемого ДВФУ, утвержденного приказом ректора ДВФУ ректора от 07.07.2015 № 12-13-1282.

УМКД обсужден на заседании Департамента пищевых наук и технологий Школы биомедицины ДВФУ протокол № 1 от «11» июля 2018 г.

Директор департамента

пищевых наук и технологий Ю.В. Приходько

Составитель: к. т. н, доцент Добрынина Е.В.

ANNOTATION  
of the educational complex of discipline  
«Modern manufacturing technologies for the manufacture and storage of food /  
Современные производственные технологии изготовления и хранения  
пищевой продукции»

Direction of preparation: 04.19.01 Biotechnology

Educational program: "Agri-Food Biotechnology"

The educational-methodical complex of the discipline «Modern manufacturing technologies for the manufacture and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции» was developed for students of the 2 course in the direction of 04/19/01 Biotechnology in accordance with the requirements of OS HE in this direction.

The discipline «Modern manufacturing technologies for the manufacture and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции» is included in the variable part of block B1.V.04 of the required subjects of the curriculum.

The total complexity of mastering the discipline is 144 hours. The curriculum includes lecture classes (18 hours), practical classes (36 hours), independent work of the student (36 hours), control of the student's independent work (54 hours). The discipline is implemented on the 2 course on the 3 semester.

The content of the discipline covers the following range of issues:

Combined products based on raw materials of animal and vegetable origin and their analogues; Primary processing of livestock; Physico-chemical and biochemical principles of the production of meat and meat products; Biotechnology of meat products; The use of microorganisms in the biotechnology of meat products.

The discipline “Modern production technologies for the manufacture and storage of food products” is logically and meaningfully connected with such courses as “Development of food technology for dietary therapeutic and dietary

preventive nutrition”, “Agricultural biotechnology and biotechnology raw materials of animal and plant origin ”, " Research Methods in Biotechnology ".

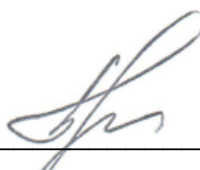
The discipline is aimed at the formation of professional competencies.

Educational complex includes:

- the work program of the discipline;
- educational and methodological support of students' independent work (Appendix 1);
- appraisal fund (appendix 2).

Директор Департамента

пищевых наук и технологий



Ю.В. Приходько



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ  
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пищевых наук и технологий

Ю.В. Приходько  
(подпись) (Ф.И.О. )

«12» июля 2018 г.

**РАБОЧАЯ ПРОГРАММА УЧЕБНОЙ ДИСЦИПЛИНЫ**

Modern production technologies for the manufacture and storage of food products

**Направление подготовки 19.04.01 Биотехнология**

Магистерская программа «Agri-Food Biotechnology»

**Форма подготовки очная**

Курс 2, семестр 3

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Лабораторные работы – - час.

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в том числе на подготовку к экзамену \_\_\_\_\_ час.

Всего часов – 144 час.

Всего часов аудиторной нагрузки – 36 час.

Зачет - семестр

Экзамен 3 семестр

Рабочая программа составлена в соответствии с требованиями образовательного стандарта, самостоятельно устанавливаемого ДВФУ, утвержденного приказом ректора от 07.07.2015 № 12-13-1282.

Рабочая программа обсуждена на заседании Департамента пищевых наук и технологий Школы биомедицины ДВФУ протокол № 1 от «11» июля 2018 г.

Директор департамента Ю.В. Приходько  
Составитель: к. т. н, доцент Добрынина Е.В.

**Оборотная сторона титульного листа РПУД**

**I. Рабочая программа пересмотрена на заседании ДПНиТ:**

Протокол от «\_\_\_\_\_» \_\_\_\_\_ 20\_\_ г. № \_\_\_\_\_

Директор Департамента \_\_\_\_\_ Приходько Ю.В. \_\_\_\_\_  
(подпись) (И.О. Фамилия)

**II. Рабочая программа пересмотрена на заседании ДПНиТ:**

Протокол от «\_\_\_\_\_» \_\_\_\_\_ 20\_\_ г. № \_\_\_\_\_

Директор Департамента \_\_\_\_\_ \_\_\_\_\_  
(подпись) (И.О. Фамилия)

## ABSTRACT

### ABSTRACT

**Master's degree in** 19.04.01 «Biotechnology»

**Master's Program** «Agri-Food Biotechnology»

Course title: « Modern production technologies for the manufacture and storage of food products».

The variable part of the block B1.V. 04

At the beginning of the course the student must be able to:

- possession of the main methods, methods and means of obtaining, storing, processing information, computer skills as a means of managing information;
- the ability to find and evaluate new technological solutions, implement the results of biotechnological research and development;
- the ability to carry out the process in accordance with the regulations and use technical means to measure the main parameters of biotechnological processes, the properties of raw materials and products.

**Course description:** Combined products based on raw materials of animal origin and their analogues; Primary processing of livestock; Physico-chemical and biochemical basis for the production of meat and meat products; Biotechnology of meat products; The use of microorganisms in the biotechnology of meat products.

#### **Main course literature:**

1. Gurinovich, G.V. Tekhnologiyamyasa i myasnykhproduktov. Pervichnayapererabotkaskota [Technology of meat and meat products. Primary processing of livestock] [Electronic resource]: a tutorial / G.V. Gurinovich, O.M. Myshalova, K.V. Lisin. - Electron. Dan. - Kemerovo: KemSU, 2015. - 121 p. - Access mode: <https://e.lanbook.com/book/72027>. - Title from the screen.
2. Egorchenkova, L.A.Tovarovedeniye i ekspertizaodnorodnykhgrupptovarov. Myaso i myasnyyeprodukty[Merchandising and examination of homogeneous groups of goods. Meat and meat products] [Electronic resource]: study guide / L.A. Egorchenkova. - Electron. Dan. -

Kemerovo: KemSU, 2006. - 124 p. - Access mode: <https://e.lanbook.com/book/4629>. - Title from the screen.

3. Myshalova, O.M. Tekhnologiya myasa i myasnykhproduktov [Technology of meat and meat products] [Electronic resource]: a tutorial / O.M. Myshalova, D.V. Kecelashvili. - Electron. Dan. - Kemerovo: KemSU, 2012. - 96 p. - Access mode: <https://e.lanbook.com/book/45632>. - Title from the screen.

4. Pishchevyye dobavki i uluchshiteli v tekhnologii myasa i myasoproduktov [Food additives and improvers in the technology of meat and meat products] [Electronic resource]: a tutorial / G.O. Yezhkova [et al.]. - Electron. text data. - Kazan: Kazan National Research Technological University, 2010. - 132 p. - 978-5-7882-0934-0. - Access mode: <http://www.iprbookshop.ru/62543.html>

5. Rogozhin, V.V. Biokhimiya moloka i myasa [Biochemistry of milk and meat] [Electronic resource]: textbook / V.V. Rogozhin. - Electron. Dan. - St. Petersburg: GIORD, 2012. - 456 p. - Access mode: <https://e.lanbook.com/book/58740>. - Title from the screen.

6. Sovremennyye metody analiza myasa i myasoproduktov [Modern methods of analysis of meat and meat products] [Electronic resource]: a tutorial / E.Sh. Yunusov [et al.]. - Electron. text data. - Kazan: Kazan National Research Technological University, 2013. - 156 p. - 978-5-7882-1522-8. - Access mode: <http://www.iprbookshop.ru/62280.html>

7. Tekhnologiya myasa i myasnykhproduktov [Technology of meat and meat products] [Electronic resource]: a tutorial / V. Ya. Ponomarev [et al.]. - Electron. text data. - Kazan: Kazan National Research Technological University, 2008. - 145 p. - 5-7882-0303-1. - Access mode: <http://www.iprbookshop.ru/63496.html>

Form of final control of knowledge: exam

## ANNOTATION

The discipline «Modern manufacturing technologies for the manufacture and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции» is included in block B1.V.04 and relates to its variable part of the training direction 04/19/01 Biotechnology. The complexity of the discipline is 4 credits, 144 hours. The discipline is one of the integral in the fundamental training of masters of this profile and is closely related to such disciplines as “Development of food technology for dietary therapeutic and preventive nutrition”, “Agricultural biotechnology and biotechnology of animal and vegetable raw materials”, “Research methods in biotechnology”.

**The purpose** of the study of the discipline is to master the principles and approaches of rational use of raw materials of animal and vegetable origin by future specialists in order to obtain food products, the selection of flexible formulations for the chemical composition of the recipe components of the product and the introduction of new types of products balanced in terms of the biological value of the raw materials.

### **Objectives of the discipline:**

- the formation of a knowledge system in the field of biotechnology of food products from raw materials of animal origin;
- the study of the basic principles of the approach to the development of rational formulations of new types of meat products;
- familiarization with the problems of reducing losses at all stages of production and increasing the volume of products produced from a unit of raw materials, as well as the problems of rational use of raw materials and other types of resources.



As a result of studying this discipline, students form the following competencies (elements of competencies):

Code and wording of competency	Competency Stages	
PK-2 with the ability to analyze scientific and technical information in the field of biotechnology and related disciplines with the aim of scientific, patent and marketing support for ongoing basic research and technological development	Knows	methods of organizing research and development work, assessing the quality of performance
	Is able	use in practice the skills in organizing research and development, evaluate the quality of performance
	Owns	the ability to use in practice the skills in organizing research and development, assessing the quality of performance
PK-3 with the ability to present the results of the work performed in the form of scientific and technical reports, reviews, scientific reports and publications using the modern capabilities of information technology and taking into account the requirements for the protection of intellectual property	Knows	intellectual property requirements
	Is able	to present the results of work in the form of scientific and technical reports, reviews, scientific reports and publications
	Owns	навыками представлять результаты выполненной работы в виде научно-технических отчетов, обзоров, научных докладов и публикаций с использованием современных возможностей информационных технологий и с учетом требований по защите интеллектуальной собственности
PK-8 ability to conduct a feasibility study of production and the preparation of technical and economic documentation	Knows	types of technological process in food production
	Is able	apply knowledge in the design of the technological process in food production
	Owns	the ability to conduct a feasibility study of production and the preparation of technical and economic documentation
PK-9 readiness to use the basic principles of organization of metrological support of production	Knows	basic principles of organization of metrological support for the production of agricultural raw materials and food products
	Is able	use the basic principles of organizing metrological support for the production of agricultural raw materials and food products
	Owns	skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products
PK-11 ability to provide technological discipline,	Knows	the sanitary-hygienic operating mode of the enterprise, the maintenance of technological equipment in proper

sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition		technical condition
	Is able	provide technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
	Owns	the skill of ensuring the sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition

To form the above competencies within the discipline "Modern production technologies for the manufacture and storage of food products / The following methods of active / interactive training are used: problem lecture, map intelligence, small group method.

## I. CONTENTS OF THEORETICAL PART OF THE COURSE

### Lecture classes (18 hours)

#### **Topic 1 Qualitative characteristic of meat. Rational use of raw materials of animal origin (4 hours)**

Organoleptic indicators of meat quality. Safety requirements for TR TS. Conditionally suitable meat. Requirements for raw materials for the production of meat products. Characteristics of meat for production: semi-finished meat products; raw smoked and dried products; cooked sausages; sterilized meat products. Veterinary and sanitary control at meat processing enterprises.

Cutting, deboning, meat trimming for the production of meat products. The grade of meat. Norms of meat yield during boning and trimming. Meat grade standards. Use of edible bone, veins, pork skins.

#### **Topic 2 Meat emulsions (“Problematic lecture”) (4 / 2h)**

Scientific and practical basis for the preparation of emulsions. The physicochemical nature of the process. Factors determining the stability of meat emulsions. Technical and technological aspects of the preparation of meat emulsions. Component bookmark order. The influence of technical means on the

quality of meat emulsions. Preparation of meat emulsions containing protein preparations. Features of modern methods for producing meat emulsions.

Problem questions for the lecture:

1. The concept of emulsion.
2. The concept of meat emulsion and the process of its formation.
3. The processes occurring in meat emulsion during heat treatment.
4. Additives used to adjust the pH of raw meat.
5. The water-binding ability of raw meat and factors affecting it.
6. Food additives used to increase the yield of the finished product.
7. Optimal pH values of muscle proteins and additives that affect them.
8. The effect of the quantitative ratio of the components of the meat emulsion on its stability.
9. Physical factors affecting the quality and stability of meat emulsions.

### **Topic 3 Biotechnology of raw materials of plant origin (2 hours)**

Characteristics of the main raw materials. General principles for the production of food based on plant materials. Classification. Genetically modified raw materials.

### **Topic 4 Products obtained through biological conversion (4 hours)**

Getting food and drinks through fermentation. Food protein. Products from genetically modified organisms (GMOs).

### **Topic 5 Storage of products obtained on the basis of raw materials of animal and vegetable origin 4 h)**

Terms and conditions of shelf life of products. Extension of shelf life through the use of barrier shells and barrier technologies. Packaging products in a modified atmosphere and in a vacuum.

Requirements for finished products. Defects are hidden, removable, and irreparable.

## **II. STRUCTURE AND CONTENT OF THE PRACTICAL PART OF THE COURSE**

### **Practical classes (36 hours)**

#### **Lesson 1: Determination of protein fractions in meat raw materials and finished meat products (4 hours)**

1. The study of the structure of proteins.
2. The study of the properties of proteins.
3. Methods for the determination of proteins.

#### **Lesson 2. Determination of moisture content in a food product (small group method) (8 h / 8 h)**

1. The role of moisture in food systems.
2. Methods for determining the moisture content.

*Small Group Method:* The issue of increased moisture in the food system is being considered. In the previous lesson, students are given the task of preparing an informational review of the moisture content in food systems and food products. In the lesson, the teacher (leader) divides the group into two subgroups, one of which advocates “FOR” the increased moisture content in the food system and gives ways to increase and retain moisture, and the second group “AGAINST”. The result of the lesson is the conclusion on the question: “Is it possible to increase the level of moisture in food systems and for which food systems is it relevant and promising?”

#### **Lesson 3. Determination of the total content of mineral components (ash) in meat products (6 hours)**

1. The study of the composition and importance of minerals.
2. Methods for the determination of minerals.
  - 2.1 Qualitative determination of the content of mineral substances.
  - 2.2 Quantitative determination of the content of minerals.

An intelligence map on this topic is compiled in the form of a diagram containing the role of minerals in nutrition, in the technological process, as well as the content in raw materials and methods for determining minerals.

**Lesson 4. Determining the activity of enzymes in raw meat and meat products (6h)**

1. The study of the classification of enzymes.
2. Properties of enzymes and enzyme preparations.
3. Methods for determining the activity of enzymes.
4. The use of enzymes and enzyme preparations.

**Lesson 5. Determination of the degree of protein denaturation (6 h)**

1. The concept of protein denaturation.
2. Factors contributing to protein denaturation.
3. The difference between denaturation and coagulation.
4. Changes in the physical properties of the protein during denaturation.
5. Changes in the biological activity of the protein during denaturation.
6. The structure of the protein molecule.

**Lesson 6. Selection of technological equipment for the production of smoked, cooked and semi-smoked sausages (6 hours)**

1. The study of equipment for the production of smoked, cooked and semi-smoked sausages.
2. Selection of equipment for the production of raw smoked, cooked and semi-smoked sausages.
3. Calculation of equipment for the production of raw smoked, cooked and semi-smoked sausages.

**III. TRAINING AND METHODOLOGICAL SUPPORT OF STUDENTS'S INDEPENDENT WORK**

Educational and methodological support for the independent work of students in the discipline «Modern manufacturing technologies for the manufacture

and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции» is presented in Appendix 1 and includes:

- a schedule of independent work on the discipline, including approximate norms of time to complete each task;
- characteristics of tasks for independent work of students and guidelines for their implementation;
- requirements for the presentation and presentation of the results of independent work;
- criteria for evaluating the performance of independent work.

#### IV. CONTROL OF ACHIEVING COURSE OBJECTIVES

№	Supervised sections / topics of discipline	Codes and stages of formation of competencies		Evaluation Tools	
				current control	intermediate certification
1	Topic: Food Biotechnology. Primary livestock processing	PK-2; PK-3; PK-8; PK-9; PK-11	Knows the basic methods and technologies of his professional sphere; standard and certification tests of raw materials, finished products; the main stages of the biotechnological process; types of pilot and pilot plants for the production and processing of meat and meat products	UO-1 - interview , UO-2 - colloquium, PR-4 - abstract	Offset Questions 1-18 PR-1 - Final Test
2	Topic: Physico-chemical and biochemical principles of the production of meat and meat products		Able to apply modern methods and technologies (including information) in professional activities; apply the methods and techniques of conducting experimental research in their professional field; describe and characterize the main stages of the biotechnological process; to participate in the research of the biotechnological process (technological process)	UO-1 - interview , UO-2 - colloquium, PR-4 - abstract	Offset Questions 19-36 PR-1 - final test

3	Topic: Biotechnology of meat products		Fluent in terminology, skills in using modern methods and technologies (including information) in professional activities; skills in conducting standard and certification tests of raw materials, finished products; skills to develop the main stages of the biotechnological process; research skills in the field of biotechnological / technological processes in pilot and pilot plants	UO-1 - interview , UO-2 - colloquium, PR-4 - abstract	Exam Questions 1-65 PR-1 - final test
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Control and methodological materials, as well as criteria and indicators necessary for assessing knowledge, skills, and characterizing the stages of formation of competencies in the process of mastering the educational program are presented in Appendix 2.

## **V. LIST OF TRAINING LITERATURE AND INFORMATION AND METHODOLOGICAL SUPPORT OF DISCIPLINE**

### **Main literature**

1. Modeling food recipes and technologies for their production. Theory and practice: a textbook for universities / O. N. Krasulya, S.V. Nikolaeva, A.V. Tokarev et al. - St. Petersburg: GIOR, 2015. Access mode: [http://lib.dvfu.ru : 8080 / lib / item? Id = chamo: 783701 & theme = FEFU](http://lib.dvfu.ru:8080/lib/item?Id=chamo:783701&theme=FEFU)
2. Measuring methods for monitoring indicators of quality and safety of food: [study guide] [at 2 o'clock]: o'clock. Products of plant origin / V.V. Shevchenko, A.A. Vytovtov, L.P. Nilova [et al.]. St. Petersburg: Trinity Bridge, 2009 .-- 303 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:358418&theme=FEFU>
3. Food ingredients in the creation of modern food / [ed. V.A. Tutelyan, A.P. Nechaev]. Moscow: DeLi Plus, 2014 .-- 519 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:732001&theme=FEFU>
4. Dunchenko, N.I. Product Quality Management. Food industry. For

masters [Electronic resource]: textbook / N.I. Dunchenko, M.P. Schetinina, V.S. Yankovskaya. - The electron. Dan. - St. Petersburg: Doe, 2019. -- 244 p. <https://e.lanbook.com/book/108448>

5. Khrundin D.V. General technology of food production [Electronic resource]: textbook / Khrundin DV - Electron. textual data. — Kazan: Kazan National Research Technological University, 2016.— 120 p. <http://www.iprbookshop.ru/79338.html>

### **Additional literature**

1. Bazarnova, Yu.G. Comprehensive determination of the degree of freshness of meat: Guidelines for laboratory work No. 5 in the courses "Agri-Food Biotechnology" and "Biological Safety of Raw Materials and Animal Products" for special students. 260301 [Electronic resource]: guidelines / Yu.G. Bazarnova, T.E. Burova, K.Yu. Poles; under the editorship of A.L. Ishevsky. - The electron. Dan. - St. Petersburg: NRU ITMO, 2008. - 18 p. - Access mode: <https://e.lanbook.com/book/43487>. - Zagl. from the screen.

2. Bazarnova, Yu.G. Determination of the activity of intracellular proteolytic enzymes of muscle tissue: Methodological instructions for laboratory work No. 1 for the course "Methods for the study of meat and meat products" for special students. 260301 of all forms of training [Electronic resource]: guidelines / Yu.G. Bazarnova, T.E. Burova, K.Yu. Poles; under the editorship of ON THE. Uvarova. - The electron. Dan. - St. Petersburg: NRU ITMO, 2008. - 12 p. - Access mode: <https://e.lanbook.com/book/43480>. - Zagl. from the screen.

3. Bazarnova, Yu.G. Determination of the content of products of hydrolysis of proteins and peptides in muscle tissue: Methodological instructions for laboratory work No. 3 for the course "Methods for the study of meat and meat products" for special students. 260301 [Electronic resource]: guidelines / Yu.G. Bazarnova, T.E. Burova, K.Yu. Poles; under the editorship of ON THE. Uvarova. - The electron. Dan. - St. Petersburg: NRU ITMO, 2008. - 10 p. - Access mode:



<https://e.lanbook.com/book/43483>. - Zagl. from the screen. Биотехнология мяса и мясопродуктов: курс лекций : учебное пособие для вузов / И. А. Рогов, А. И. Жаринов, Л. А. Текутьева [и др.]. - Москва: ДеЛи принт, 2009. - 294 с.  
<http://lib.dvfu.ru:8080/lib/item?id=chamo:664778&theme=FEFU>

4. Kim, E.N. Methods and means of analysis of food raw materials and products: textbook. manual for universities / E.N. Kim [et al.]. - Vladivostok: Dalrybvtuz, 2004. -- 216 p.  
<http://lib.dvfu.ru:8080/lib/item?id=chamo:353535&theme=FEFU>

5. Kovaleva, I.P. Methods of studying the properties of raw materials and food: a textbook for universities / I.P. Kovaleva, I.M. Titova, O.P. Chernega. - St. Petersburg: Prospect of Science, 2012. -- 151 p.  
<http://lib.dvfu.ru:8080/lib/item?id=chamo:785526&theme=FEFU>

6. Poznyakovsky V. M. Examination of meat and meat products. Quality and safety [Electronic resource]: training manual / V.M. Poznyakovsky. - The electron. textual data. - Saratov: Higher education, 2014. - 527 с. - 2227-8397. - Access mode: <http://www.iprbookshop.ru/4167.html>

7. Poznyakovsky V.M. Examination of poultry meat, eggs and their processed products. Quality and safety [Electronic resource]: training manual / V.M. Poznyakovsky, O.A. Ryazanova, K.Ya. Motovilov. - The electron. textual data. - Saratov: Higher education, 2014. - 219 p. - 2227-8397. - Access mode: <http://www.iprbookshop.ru/4168.html>

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9. Rational processing of raw materials in the production of meat products: a textbook for universities / T.K. Kalenik, O. V. Tabakaeva, V. A. Lyakh, M. V. Kravchenko. - Vladivostok: Publishing House of the Far Eastern Federal University, 2013. - 189 p.  
<http://lib.dvfu.ru:8080/lib/item?id=chamo:791760&theme=FEFU>

10. Rogozhin, V.V. Biochemistry of muscles and meat: a textbook for universities / V.V. Rogozhin. - St. Petersburg: GIORN, 2009 .-- 237 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:353961&theme=FEFU>

11. Smirnov, A.V. Cutting meat in Russia and the countries of the European Union [Electronic resource]: reference book / A.V. Smirnov, G.V. Kulyakov, N.N. Kalishina. - The electron. Dan. - St. Petersburg: GIORN, 2014 .-- 136 p. - Access mode: <https://e.lanbook.com/book/69868>. - Zagl. from the screen.

12. Stability and shelf life. Meat and fish products / c D. Kilkast, P. Subramaniam (ed.-Comp.); trans. from English under the scientific. ed. Yu. G. Bazarnova. - St. Petersburg: Profession, 2012 .-- 415 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:675494&theme=FEFU>

13. The technology of processing raw materials of animal origin and aquatic organisms (biotechnological aspects): a textbook for universities / T. K. Kalenik, L. N. Fedyanina, T. V. Tanashkina, L. A. Tekutieva. - Vladivostok: Publishing House of the Pacific Economic University, 2009. - 215 p. <http://lib.dvfu.ru:8080/lib/item?id=chamoI5656708&theme=FEFU>

14. Technology, ecology and quality assessment of smoked products: textbook / O. Ya. Mezenova, I. N. Kim. - St. Petersburg: GIORN, 2009 .-- 484 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:664666&theme=FEFU>

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16. Functional starter cultures in the meat industry / N. G. Mashentseva, V. V. Khorolsky. - Moscow: DeLi Print, 2008 .-- 335 from <http://lib.dvfu.ru:8080/lib/item?id=chamo:732212&theme=FEFU>

17. The chemical composition and calorie content of Russian food: [reference] / V. A. Tutelyan. - M.: DeLi Plus, 2012 .-- 283 pp. //Lib.dvfu.ru: 8080 / lib / item? Id = chamo: 731888 & theme = FEFU

## **The list of resources of the information and telecommunication network**

### **"Internet"**

1. <http://elibrary.ru> Scientific electronic library eLIBRARY.RU
2. The electronic library system "Doe" <http://e.lanbook.com/>
3. The electronic library system "IPRBOOK" <http://www.iprbookshop.ru>
4. Scopus database: <http://www.scopus.com/home.url>
5. Web of Science Database <http://apps.webofknowledge.com/>
6. Database of full-texting academic journals in China <http://oversea.cnki.net/>
7. The electronic library of dissertations of the Russian State Library  
<http://diss.rsl.ru/>
8. EBSCO Electronic Databases <http://search.ebscohost.com/>

### **Local network resources**

1. System of normative and technical documentation "Tekhekspert"
2. ATP "ConsultantPlus" (profile: Universal)

## **VI. METHODOLOGICAL INSTRUCTIONS FOR THE DEVELOPMENT OF THE DISCIPLINE**

The theoretical part of the discipline «Modern manufacturing technologies for the manufacture and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции» is revealed at the lecture classes, as a lecture is the main form of training, where the teacher gives the basic concepts of the discipline.

The sequence of presentation of the material at the lecture classes is aimed at forming an indicative basis for students for the subsequent assimilation of the material during independent work.

Practical classes of the course are held in all sections of the curriculum. Practical work is aimed at developing students' independent research work skills.

During practical classes, the student performs a set of tasks that allows you to consolidate the lecture material on the topic.

The active consolidation of theoretical knowledge is facilitated by the discussion of the problematic aspects of the discipline in the form of a seminar and classes using active learning methods. At the same time, the skills of independent research activity are developed in the process of working with scientific literature, periodicals, the formation of the ability to defend one's point of view reasonably, listen to others, answer questions, and lead discussions.

When writing essays, it is recommended that you independently find the literature for it. The abstract reveals the content of the investigated problem. Work on the essay helps to deepen understanding of individual issues of the course, to form and defend your point of view, to acquire and improve independent creative work skills, to conduct active cognitive work.

To conduct ongoing monitoring and intermediate certification, several oral interviews, test-control works and colloquiums are carried out.

## **VII. LIST OF INFORMATION TECHNOLOGIES AND SOFTWARE**

Licensed software installed on a PC at the School of Biomedicine and used as part of the discipline:

Name of the software package	Version	Function
Windows Seven Enterprise	SP3x64	Operating system
Eset NOD32 Antivirus	4.2.76.1	Malware detection tool
Microsoft Office 2010 Professional Plus	14.0.6029.1000	Office package
7-Zip	9.20.00.0	Educational software package
AbbyFineReader 11	11.0.460	Educational software package
CoogleChrome	42.0.2311.90	WWW browser

## VII. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Training lab  
Vladivostok, about. Russian p.  
Ajax 10, Building 25.1, aud. M311

Training furniture for 25 workplaces, Teacher's place (table, chair), Analytical and technological equipment (M311): Milk centrifuge with heating IJIM 1-12; Liquid thermostat LOIP Lt-208a, volume 8l, 120x150 / 200mm; Analyzer of milk quality Lactan 1-4 mod. 230; PH-millivoltmeter with tripod pH-150MI; VSP 1.5-2-3T scales; Refrigerator "Ocean-RFD-325B"; Drying cabinet, stainless steel chamber. steel, 58l; electric stove 111CH 101-226589; PE-6110 magnetic stirrer with heating; VNZh-0,3-KhS3 viscometer (d-1.41) glass capillary; Tripod PE-2710 lab. for burettes.

Multimedia equipment: Monoblock Lenovo C360G-i34164G500UDK; Screen with electric 236 \* 147 cm Trim Screen Line; DLP projector, 3000 ANSI Lm, WXGA 1280x800, 2000: 1 EW330U Mitsubishi; Subsystem of specialized hardware mounts CORSA-2007 Tuarex; Video Switching Subsystem: DVI DXP 44 DVI Pro Extron matrix switcher; Extender DVI over twisted pair DVI 201 Tx / Rx; Subsystem of audio switching and sound reinforcement; ceiling mount speaker SI 3CT LP Extron; Sennheiser EW 122 G3 UHF Microphone Lavalier Radio System with a wireless microphone and receiver; DMP 44 LC Extron digital audio processor; Extron IPL T S4 Network Management Controller; Wireless LANs for students are provided with a system based on 802.11a / b / g / n 2x2 MIMO (2SS) access points.

Reading rooms of the FEFU  
Scientific Library with open access  
to the fund  
Vladivostok, about. Russian  
settlement Ajax 10, building A -  
level 10

All-in-One HP All-in-One 400 All-in-One  
Monoblock 19.5 (1600x900), Core i3-4150T,  
4GB DDR3-1600 (1x4GB), 1TB HDD 7200  
SATA, DVD +/- RW, GigEth, Wi-Fi, BT, usb  
kbd / mse, Win7Pro (64-bit) + Win8.1Pro (64-  
bit), 1-1-1 Wty Internet access speed of 500  
Mbps. Workplaces for people with disabilities  
are equipped with braille displays and printers;  
equipped with: portable devices for reading

flat-printed texts, scanning and reading machines with a video enlarger with the ability to control color spectra; magnifying electronic magnifiers and ultrasonic markers

Computer class  
Vladivostok, about. Russian p.  
Ajax 10, Building 25.1, aud. M621,  
area 44.5 m<sup>2</sup>

Monoblock Lenovo C360G-i34164G500UDK  
19.5 "Intel Core i3-4160T 4GB DDR3-1600  
SODIMM (1x4GB) 500GB Windows Seven  
Enterprise - 17 pcs; Wired LAN - Cisco 800  
series; Wireless LAN for students with a  
system based on 802.11a / b access points / g /  
n 2x2 MIMO (2SS)



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ  
Федеральное государственное автономное образовательное учреждение  
высшего образования  
«Дальневосточный федеральный университет»  
(ДФУ)

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ШКОЛА БИОМЕДИЦИНЫ

**УЧЕБНО-МЕТОДИЧЕСКОЕ ОБЕСПЕЧЕНИЕ САМОСТОЯТЕЛЬНОЙ  
РАБОТЫ ОБУЧАЮЩИХСЯ**

**по дисциплине «Modern manufacturing technologies for the manufacture  
and storage of food / Современные производственные технологии  
изготовления и хранения пищевой продукции»**

19.04.01 Биотехнология

магистерская программа «Agri-Food Biotechnology»

**Форма подготовки очная**

**Владивосток**

**2018**

## **Schedule of independent work on the discipline**

<b>№</b>	<b>Date / Deadline</b>	<b>Type of independent work</b>	<b>Estimated time to complete</b>	<b>Form of control</b>
1	1-3 weeks	Preparation of essays	9	Offset
2	4-6 weeks	Presentation preparation	9	Offset
3	7-9 weeks	Preparing for the colloquium	9	Offset
4	10-19 weeks	Seminar preparation	9	Offset

Students' independent work consists of preparing for practical classes, working on recommended literature, writing reports on the topic of a seminar, preparing presentations.

The teacher offers each student individual and differentiated tasks. Some of them can be carried out in a group (for example, several students can do the preparation of a report and presentation on the same topic, sharing their responsibilities - one prepares a scientific and theoretical part, and the second carries out an analysis of practice).

### **Tasks for self-fulfillment**

1. On the given topic of the seminar, an analysis of the literature on the subject under study should be carried out. Information on the developed material should be prepared and submitted for discussion.
2. Writing an essay on a topic proposed by the teacher or independently selected by the student and agreed with the teacher.
3. Preparation of presentations using multimedia equipment.



## **Methodological instructions for the implementation of the essay**

### **The goals and objectives of the essay**

The essay (from lat. Referto - report, report) is a summary of the problems of a practical or theoretical nature with the formulation of certain conclusions on the subject. A student-selected problem is studied and analyzed based on one or more sources. In contrast to the term paper, which is a comprehensive study of the problem, the essay is aimed at analyzing one or more scientific papers.

*The objectives* of writing an essay are:

development of students' skills in finding relevant problems of modern legislation;

- development of skills to summarize the material with highlighting only the most significant points necessary to reveal the essence of the problem;

- development of skills to analyze the material studied and formulate their own conclusions on the selected issue in writing, in a scientific, competent language.

*The tasks* of writing an essay are:

- teach the student to convey the opinions of the authors as faithfully as possible, on the basis of which the student writes his essay;

- teach the student to correctly state their position on the problem analyzed in the abstract;

- prepare the student for further participation in scientific - practical conferences, seminars and competitions;

- help the student to determine the topic of interest to him, the further disclosure of which is possible when writing a term paper or diploma;

- to clarify for themselves and state the reasons for their consent (disagreement) with the opinion of one or another author on this issue.

### **The basic requirements for the content of the essay, course project**

The student should use only those materials (scientific articles, monographs, manuals) that are directly related to their chosen topic. Remote reasoning not

related to the problem being analyzed is not allowed. The content of the essay should be specific, only one problem should be investigated (several are allowed, only if they are interconnected). The student must strictly adhere to the logic of presentation (start with the definition and analysis of concepts, go to the problem statement, analyze the ways to solve it and draw the appropriate conclusions). The essay should end with a conclusion on the topic.

*The structure* of the abstract consists of:

1. The title page;
2. Introduction, where the student formulates the problem to be analyzed and investigated;
3. The main text, which consistently reveals the selected topic. Unlike term paper, the main text of the essay involves a division into 2-3 paragraphs without highlighting the chapters. If necessary, the text of the abstract can be supplemented by illustrations, tables, graphs, but they should not "overload" the text;
4. Conclusions, where the student formulates conclusions made on the basis of the main text.
5. The list of used literature. This list refers to those sources that the student refers to in preparing the essay, as well as others that were studied by him during the preparation of the essay.

The essay is 10-15 pages of typewritten text, but in any case should not exceed 15 pages. Interval - 1.5, font size - 14, margins: left - 3 cm, right - 1.5 cm, upper and lower - 1.5 cm. Pages must be numbered. The indent from the beginning of the line is 1.25 cm.

### **The order of delivery of the essay and its assessment**

Essays are written by students during the semester in the terms set by the teacher in a particular discipline, reported by the student and submitted for discussion. The printed version is given to the teacher, leading the discipline.

Based on the results of the check, the student is given a certain number of points, which is included in the total number of student points scored by him

during the semester. When evaluating the essay, the correspondence of the content to the chosen topic, the clarity of the work structure, the ability to work with scientific literature, the ability to pose a problem and analyze it, the ability to think logically, knowledge of professional terminology, and literacy are taken into account.

### **Recommended topics and list of essays**

1. Obtaining biologically active substances from secondary raw materials obtained during slaughter and primary processing of poultry.
2. Obtaining an unconventional assortment of food products from secondary raw materials of slaughter and primary processing of poultry.
3. Feed and feed additives based on secondary raw materials and non-food waste from poultry processing.
4. Ways to increase the biological value of dry animal feed.
5. Sulfur-containing protein supplements in the diets of farm animals and poultry.
6. Biologically active and mineral feed additives based on the rational use of secondary raw materials and waste from the meat industry.
7. Production of sausages with meat trimmings of traditional processing methods.
8. New types of meat products with beef (pork) trimmings, subjected to unconventional processing methods.
9. Current trends in improving the technique and technology of bone degreasing.
10. Directions for improving the technique and technology for extracting food protein from bone.
11. Trends in the creation of non-waste bone processing methods for enterprises of different capacities.
12. Production of new types of food products based on protein components of bone.
13. New types of meat and combination products with protein components of bone.
14. Current trends in the development of extrusion production of meat products

15. New types of meat products for general and therapeutic purposes based on extrusion technology.
16. The current state of processing of secondary raw materials of the meat industry. Prospects for expanding the range of products based on the use of additional sources of raw materials.
17. Technological scheme for the production of dry food broths from bone and bone residue.
18. Characteristics of secondary raw materials of fat production (fusa, squash). Features of the chemical composition and nutritional value of the fuse.
19. The current state of bone processing. Schemes for the integrated processing of bone to produce food and feed products.
20. The nomenclature of the secondary collagen-containing raw materials of the meat industry. Exit rates, chemical composition, functional and technological properties.
21. Flow-mechanized lines for degreasing bone. Technical and economic indicators, product quality assessment.
22. The functional and physiological role of collagen in nutrition. The use of raw materials with a high mass fraction of collagen in the technology of dietary meat products.
23. Requirements for bone raw materials for mechanical deboning. Qualitative indicators and directions of using meat of mechanical deboning.
24. Nutritional and biological value of shkvara. The use of shkvara in food production.
25. Characterization of mechanical methods for separating the remains of meat tissue from the bone. Technical characteristics of continuous and batch installations.
26. Processing keratin-containing raw materials by enzymatic hydrolysis. Feed value and ways of using enzymatic hydrolysates.

27. The essence of the physico-chemical methods for the additional treatment of meat tissue. Process characteristics; installations for the separation of pulp from bone using saline solutions.
28. Description and directions of use of keratin-containing raw materials of the meat industry. The use of keratin-containing raw material hydrolysates in the production of whole milk substitutes (milk replacer).
29. The biochemical composition of the hat. Requirements for the organization of collection, conservation for processing hat for heparin.
30. The technology of preparation of protein stabilizer from pork skin, veins and tendons.
31. The technology for producing laundry soap from fatty waste from meat plants. Product Quality Requirements.
32. Technological schemes for the production of liquid and concentrated broths. Requirements for raw materials, characteristics of the finished product.
33. Nomenclature, biochemical composition, food and feed value of secondary and technical raw materials obtained during slaughter and processing of poultry.
34. Obtaining nutritional supplements from bone and bone residue. Cryogenic grinding of bone.
35. Technological scheme for the production of chicken pepsin from the glandular stomachs of land poultry. Characteristics of finished products.
36. Characterization of bone as a raw material for food, feed, medical products: morphological structure, chemical composition, physical properties.
37. Physico-chemical composition, biochemical and microbiological indicators of the total flow of meat processing plants. Reagent wastewater treatment and ways of utilization of protein-fat components.
38. Quality requirements and areas of use of bone fat.
39. Characterization of the chemical composition and feed value of the slaughter waste of farm animals and poultry (manure, litter).
40. Ways to implement extrusion technologies in the meat industry.

- 41.. The chemical composition, biological and feed value of cananyg, the contents of the abomasum of cattle and stomachs of pigs.
42. Promising methods for processing meat trimmings for use as part of new meat products.
43. Technological schemes for producing gastric juice and ribonuclease from canyanga.
44. Sanitary requirements for the production of food broths.
45. Technology for the production of protein-vitamin feed additives from canyang and cattle base waste. Biochemical composition and feed value of additives.
46. The hardware-technological scheme of complex processing of bone with the receipt of broth cubes.
47. The concept of intensive methods for the production of feed products. Technology for processing technical raw materials in vacuum boilers with degreasing wet pulp in suspended centrifuges.
48. Groups of bone raw materials depending on the production purpose. The norms of output and directions of use of bone in the process of beef, pork, and mutton boning.
49. The technology for the production of phosphatide-protein concentrate based on fuse. Technical and economic indicators of the R3-FDA line, product characteristics.
50. The technological scheme of processing feather-down materials.
51. Technological scheme for the production of chicken oil. Characteristics of rational methods for processing eggshells.
52. Characterization of traditional and new types of raw materials for the production of artificial edible sausage casings based on collagen.
53. Scheme of complex processing of blood and its fractions with the receipt of therapeutic and prophylactic products.
54. Assortment of sausages with meat trimmings of traditional and non-traditional methods of processing. Obtaining minced emulsions for sausages using meat trimmings.



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ  
ФЕДЕРАЦИИ

Федеральное государственное автономное образовательное учреждение  
высшего образования

«Дальневосточный федеральный университет»  
(ДВФУ)

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ШКОЛА БИОМЕДИЦИНЫ

**ФОНД ОЦЕНОЧНЫХ СРЕДСТВ**

**по дисциплине «Modern manufacturing technologies for the manufacture  
and storage of food / Современные производственные технологии  
изготовления и хранения пищевой продукции»**

19.04.01 Биотехнология

магистерская программа «Agri-Food Biotechnology»

**Форма подготовки очная**

**Владивосток  
2018**

## Passport FOS

For the discipline «Modern manufacturing technologies for the manufacture and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции»

Code and wording of competency	Competency Stages	
PK-2 with the ability to analyze scientific and technical information in the field of biotechnology and related disciplines with the aim of scientific, patent and marketing support for ongoing basic research and technological development	Knows	methods of organizing research and development work, assessing the quality of performance
	Is able	use in practice the skills in organizing research and development, evaluate the quality of performance
	Owns	the ability to use in practice the skills in organizing research and development, assessing the quality of performance
PK-3 with the ability to present the results of the work performed in the form of scientific and technical reports, reviews, scientific reports and publications using the modern capabilities of information technology and taking into account the requirements for the protection of intellectual property	Knows	intellectual property requirements
	Is able	to present the results of work in the form of scientific and technical reports, reviews, scientific reports and publications
	Owns	навыками представлять результаты выполненной работы в виде научно-технических отчетов, обзоров, научных докладов и публикаций с использованием современных возможностей информационных технологий и с учетом требований по защите интеллектуальной собственности
PK-8 ability to conduct a feasibility study of production and the preparation of technical and economic documentation	Knows	types of technological process in food production
	Is able	apply knowledge in the design of the technological process in food production
	Owns	the ability to conduct a feasibility study of production and the preparation of technical and economic documentation
PK-9 readiness to use the basic principles of organization of metrological support of production	Knows	basic principles of organization of metrological support for the production of agricultural raw materials and food products
	Is able	use the basic principles of organizing metrological support for the production of agricultural raw materials and food products
	Owns	skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products
PK-11 ability to provide	Knows	the sanitary-hygienic operating mode of the enterprise,



technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition		the maintenance of technological equipment in proper technical condition
	Is able	provide technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
	Owns	the skill of ensuring the sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition

№	Supervised sections / topics of discipline	Codes and stages of formation of competencies		Evaluation Tools	
				current control	intermediate certification
1	Topic: Food Biotechnology. Primary livestock processing	PK-2; PK-3; PK-8; PK-9; PK-11	Knows the basic methods and technologies of his professional sphere; standard and certification tests of raw materials, finished products; the main stages of the biotechnological process; types of pilot and pilot plants for the production and processing of meat and meat products	UO-1 - interview , UO-2 - colloquium, PR-4 - abstract	Offset Questions 1-18 PR-1 - Final Test
2	Topic: Physico-chemical and biochemical principles of the production of meat and meat products		Able to apply modern methods and technologies (including information) in professional activities; apply the methods and techniques of conducting experimental research in their professional field; describe and characterize the main stages of the biotechnological process; to participate in the research of the biotechnological process (technological process)	UO-1 - interview , UO-2 - colloquium, PR-4 - abstract	Offset Questions 19-36 PR-1 - final test
3	Topic: Biotechnology of meat products		Fluent in terminology, skills in using modern methods and technologies (including information) in professional activities; skills in conducting standard and certification tests of raw materials, finished products; skills to develop the main stages of the biotechnological process; research skills in the field of biotechnological / technological processes in	UO-1 - interview , UO-2 - colloquium, PR-4 - abstract	Exam Questions 1-65 PR-1 - final test

			pilot and pilot plants		
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**Competency Level Assessment Scale for the discipline  
«Modern manufacturing technologies for the manufacture and storage of  
food / Современные производственные технологии изготовления и  
хранения пищевой продукции»**

<b>Code and wording of competency</b>	<b>Competency Stages</b>		<b>Criteria</b>	<b>Indicators</b>	<b>Points</b>
PK-2 with the ability to analyze scientific and technical information in the field of biotechnology and related disciplines with the aim of scientific, patent and marketing support for ongoing basic research and technological development	knows (threshold level)	The methods of organizing research and development work, assessing the quality of performance	has ideas about the organization of research and development, assessment of the quality of performance	Formed ideas about the organization of research and scientific-production work, quality assessment of performance	45-64
	able (advanced)	use in practice the skills in organizing research and development, evaluate the quality of performance	the ability to put into practice the skills and abilities in the organization of research and development, to evaluate the quality of performance	ability to freely use in practice the skills and abilities in the organization of research and development, to evaluate the quality of performance	65-84
	owns (high)	the ability to use in practice the skills in organizing research and development, assessing the quality of performance	owns the basic methodological principles in practice, the skills and abilities in organizing research and development, evaluate the quality of performance	fully owns the methodological principles in practice skills and abilities in the organization of research and development, to evaluate the quality of performance	85-100
PK-3 with the ability to present the results of the	knows (threshold level)	intellectual property requirements	Knowledge of intellectual property protection	Ability to apply knowledge of intellectual property	45-64

work performed in the form of scientific and technical reports, reviews, scientific reports and publications using the modern capabilities of information technology and taking into account the requirements for the protection of intellectual property			requirements	protection requirements	
	able (advanced)	to present the results of work in the form of scientific and technical reports, reviews, scientific reports and publications	Ability to present work results in the form of scientific and technical reports, reviews, scientific reports and publications	Ability to present work results in the form of scientific and technical reports, reviews, scientific reports and publications	65-84
PK-8 ability to conduct a feasibility study of production and the preparation of technical and economic documentation	owns (high)	skills to present the results of the work performed in the form of scientific and technical reports, reviews, scientific reports and publications using the modern capabilities of information technology and taking into account the requirements for the protection of intellectual property	Possession of modern ways to present the results of the work performed in the form of scientific and technical reports, reviews, scientific reports and publications using the modern capabilities of information technology and taking into account the requirements for the protection of intellectual property	The ability to present the results of the work in the form of scientific and technical reports, reviews, scientific reports and publications using the modern capabilities of information technology and taking into account the requirements for the protection of intellectual property	85-100
	knows (threshold level)	types of technological process in food production	Knowledge of the types of technological process in food production	The ability to apply knowledge about the types of technological process in production	45-64
	able (advanced)	apply knowledge in the design of the technological process in food production	The ability to apply knowledge in the design of the technological process in food production	The ability to apply knowledge in the design of the technological process in food production	65-84

	owns (high)	the ability to conduct a feasibility study of production and the preparation of technical and economic documentation	The ability to conduct a feasibility study of production and the preparation of technical and economic documentation	The ability to conduct a feasibility study of production and the preparation of technical and economic documentation	85-100
PK-9 readiness to use the basic principles of organization of metrological support of production	knows (threshold level)	basic principles of organization of metrological support for the production of agricultural raw materials and food products	Knowledge of the basic principles of the organization of metrological support for the production of agricultural raw materials and food products	The ability to use the basic principles of the organization of metrological support for the production of agricultural raw materials and food products	45-64
	able (advanced)	use the basic principles of organizing metrological support for the production of agricultural raw materials and food products	Ability to use the basic principles of organizing metrological support for the production of agricultural raw materials and food products	The ability to use the basic principles of the organization of metrological support for the production of agricultural raw materials and food products	65-84
	owns (high)	skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products	Skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products	The ability to use the basic principles of the organization of metrological support for the production of agricultural raw materials and food products	85-100
PK-11 ability to provide technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in	knows (threshold level)	the sanitary-hygienic operating mode of the enterprise, the maintenance of technological equipment in proper technical condition	Knowledge of the sanitary-hygienic operating conditions of the enterprise, the maintenance of technological equipment in proper technical condition	The ability to apply sanitary-hygienic modes of operation of the enterprise, the maintenance of technological equipment in proper technical condition	45-64
	able	provide	Ability to	The ability to	65-84

proper technical condition	(advanced )	technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition	provide technological discipline, sanitary-hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition	provide technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition	
	owns (high)	the skill of ensuring the sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition	Skill in ensuring the sanitary-hygienic regime of the enterprise, maintenance of technological equipment in the proper technical process	Ability to possess the ability to ensure the sanitary-hygienic regime of the enterprise, the maintenance of technological equipment in the proper technical	85-100

### I. Evaluation tools for intermediate certification

Interim certification includes the student's answer to the questions for the test, the exam and the passage of the final test.

#### Questions for the exam

1. Packaging and labeling requirements for meat products.
2. The main nutrients and the structure of meat tissue.
3. Ways to extend the shelf life of chilled meat semi-finished products.
4. Qualitative characteristics of meat for the production of meat products.
5. Defects in meat. Conditionally suitable meat. Tanning meat.
6. Sausage casings: classification, characteristics, methods of preparation for work.
7. The essence of salting meat. Intensification of the ambassador.
8. Sodium nitrite. The color formation reaction. Safety requirements at work.
9. Functional and technological properties of meat.
10. Secondary meat raw materials, its functional and technological properties.
11. The essence of biochemical changes in meat after slaughter.

12. Meat semi-finished products: classification and technological scheme of production.
13. The biochemical essence of salting meat.
14. Defects of finished sausages, causes of their occurrence.
15. The essence of the processes of sediment, frying, cooking and smoking meat products.
16. Classification of meat products. Combined meat products and their analogues.
17. Qualitative characteristic of sausages
18. Soy protein preparations, their functional and technological properties.
19. Ways to intensify the ripening process.
20. Curing components, their functional properties.
21. Biotechnology of raw smoked meat products.
22. The rational use of raw materials. Cutting, boning, meat trimming.
23. Requirements for finished meat products.
24. Theoretical foundations of microbiological processes in meat.
25. Biotechnology of products from secondary protein raw materials.
26. Enzymes. Biotechnology of fermented meat products.
27. Biotechnology of restructured meat products.
28. Technology emulsified meat products.
29. Defects in sausages. The reasons for their occurrence.
30. Whole muscle biotechnology
31. Methods of accelerating the ripening of meat
32. Defrosting meat. Methods and parameters of defrosting.
33. Classification of methods of processing meat with cold. The essence of the processes.
34. Meat emulsions, factors affecting the stability of meat emulsions.
35. Factors affecting the stability of meat emulsions.
36. Packaging and labeling requirements for meat products.
37. Autolytic changes in meat.
38. Defrosting meat. Methods and modes of defrosting.

39. Ambassador of meat. Intensification of the ambassador.
40. Classification and characteristics of the methods of processing meat with cold.
41. Technology emulsified products.
42. Functional and technological properties of secondary meat raw materials.
43. Canned meat: range and technological scheme of production.
44. The essence of the salting of meat. Ways to accelerate the salting.

### **Final test task**

#### **Variant №1**

**1. Uncastrated males are called:**

- a) bulls, boars;
- b) hogs, oxen;
- c) valuhi, gilts.

**2. The moisture content in meat affects:**

- a) organoleptic indicators;
- b) the amount of minerals;
- c) for protein scor.

**3. The duration of storage of chilled meat can be increased by:**

- a) mechanical softening;
- b) open light;
- c) the use of a mixture of inert gases.

**4. Adding food phosphates to meat products suggests:**

- a) the last expiration date;
- b) increased water binding capacity of proteins;
- c) improve the taste.

#### **Variant №2**

**1. Cattle is considered to be young if its age:**

- a) up to 3 months;
- b) from 3 months to 1.5 years;
- c) from 3 months to 3 years.

**2. The sequence of post-slaughter changes in meat:**

- a) maturation, deep autolysis, rigor mortis;
- b) muscle rigor, maturation, deep autolysis;
- c) deep autolysis, rigor mortis, maturation.

**3. The meat is considered frozen if its temperature:**

- a) minus 5 ° C;
- b) minus 8 ° C;
- c) 0 - 4 ° C.

**4. When boning meat:**

- a) are divided into varieties;
- b) separate the meat part of the half-carcass from the bones;
- c) adipose tissue is separated.

**Variant №3**

**1. Blood plasma is received:**

- a) from stabilized blood;
- b) from defibrated blood;
- c) from coagulated blood.

**2. Carbohydrate muscle tissue are:**

- a) hemoglobin, myoglobin;
- b) glycogen, maltose, glucose;
- c) cholesterol, glycogen.

**3. Cold preservation of meat is based on the biological principle named:**

- a) biosis;
- b) abiosis;
- c) suspended animation.

**4. Curing components are:**

- a) salt, sugar, sodium nitrite, phosphates;
- b) salt, spices;
- c) salt, soy proteins, water.

**Variant №4**

**1. Stunning animals produce with the aim of:**



- a) better nutrition;
- b) more complete collection of blood;
- c) ensure the safety of workers.

**2. The main elements of muscle fiber:**

- a) sarcolemma, sarcoplasm, myofibrils,
- b) cell, nucleus, collagen,
- c) proteins, fats, vitamins.

**3. The meat is considered chilled if its temperature:**

- a) 0 - minus 2 ° C;
- b) 0 -4 ° C;
- c) 4-8 ° C.

**4. The first grade includes beef containing fat and connective tissue no more than:**

- a) 10%;
- b) 6%;
- c) 2 %.

**Variant №5**

**1. Pork is called large:**

- a) fully skinned;
- b) with partially skinned from the back of the carcass;
- c) with not removed skin.

**2. The red color of the blood determines the presence in it:**

- a) myosin;
- b) myoglobin;
- c) hemoglobin.

**3. Meat is considered cooled if its temperature:**

- a) 0-4 ° C;
- b) 12 ° C;
- c) minus 8 ° C.

**4. The shelf life of chilled semi-finished products can be extended by:**

- a) the use of the best varieties of meat;
- b) storage at minus 18 ° C;
- c) packaging in a modified atmosphere.

#### **Variant №6**

##### **1. Offal of the first category:**

- a) brains; liver, kidneys;
- b) spleen, heart, trachea;
- c) light, pork tail.

##### **2. The functional properties of the protein include:**

- a) nutritional value;
- b) susceptibility to putrefaction;
- c) the ability to form gels.

##### **3. The duration of storage of meat depends on:**

- a) the thermal state of the meat;
- b) the amount of meat in the refrigerator;
- c) installation of an air curtain.

##### **4. Meat veining is a process:**

- a) the separation of meat half carcasses into cuts;
- b) separation of the pulp of the carcass from the bones;
- c) separation of muscle tissue from adipose and connective tissue.

#### **Variant №7**

##### **1. It is forbidden to use meat for the production of semi-finished meat products:**

- a) with a fat content of more than 10%;
- b) meat of castrated males;
- c) twice frozen.

##### **2. Freeze-drying is:**

- a) dehydration of the product from a solid state (ice);
- b) product dehydration in ovens;
- c) dehydration of the product in a centrifuge.

**3. Secondary meat protein-containing raw materials include:**

- a) meat of the 2nd grade;
- b) pork skin, shkvara, offal 2 K., blood;
- c) fatty pork.

**4. To obtain rennet is used:**

- a) the stomach of pigs;
- b) abomasum of young calves;
- c) abomasum of cattle.

**Variant №8**

**1. Blood serum is obtained by passing it through:**

- a) a separator;
- b) defibrinator and separator;
- c) homogenizer.

**2. Introduction to meat of plant enzymes contributes to:**

- a) extension of shelf life;
- b) softening the meat tissue;
- c) color stabilization.

**3. The loss in mass of frozen meat during storage depends on:**

- a) from temperature;
- b) storage duration and relative humidity;
- c) the presence of an air curtain.

**4. Food additive that stabilizes the color formation in sausages:**

- a) benzoic acid;
- b) glutamic acid;
- c) ascorbic acid.

**Variant №9**

**1. When processing pork cows leave one layer, which is called:**

- a) submucosal;
- b) muscle;
- c) serous.

**2. The duration of the ripening of meat is reduced when:**

- a) raising the temperature to 18-20 ° C;
- b) lowering the temperature to 0-4 ° C;
- c) increased air exchange in the chamber.

**3. The most progressive way to defrost meat is:**

- a) in a vapor-air environment;
- b) the use of microwave heating;
- c) steam in the vacuum of the massager.

**4. The stability of the meat emulsion depends on:**

- a) the amount of protein, fat, water, temperature, the presence of a stabilizer;
- b) the speed of rotation of the cutter knives;
- C) the number of spices introduced into the emulsion.

**Variant №10**

**1. Plant-based enzymes:**

- a) papain, bromelain, ficin;
- b) pepsin, chymotrypsin, ficin;
- c) papain, trypsin.

**2. When freezing in liquid boiling media I use as a refrigerant:**

- a) carbon monoxide;
- b) hydrogen, sulfur dioxide;
- c) nitrogen, carbon dioxide.

**3. Meat ripening occurs under the influence of:**

- a) oxygen;
- b) temperature factor;
- c) own intracellular enzymes.

**4. Collagen-containing offal:**

- a) pork skin, meat trimmings;
- b) ears, lips, pork tails;
- c) lung, spleen.

### Коды правильных ответов

Question Variant	1	2	3	4
1	a	a	c	b
2	c	b	b	b
3	a	a	c	a
4	c	a	b	b
5	b	c	b	b
6	a	c	a	c
7	c	a	b	b
8	b	b	b	c
9	a	a	c	a
10	a	c	c	b

Tasks with the choice of one correct answer.

The task takes 45 minutes to complete.

The number of tasks in each option is 4. The number of answers is 1.

## II. Evaluation tools for ongoing certification

### Evaluation Criteria

- 100-86 points are awarded to the student, if the student expressed his opinion on the formulated problem, argued for it, accurately determining its content and components. The data of domestic and foreign literature, statistical information, regulatory information are given. The student knows and possesses the skill of independent research work on the topic of research; methods and techniques of analysis of theoretical and / or practical aspects of the study area. There are no factual errors related to understanding the problem; graphically, the work is framed correctly

- 85-76 - points - the work is characterized by semantic integrity, coherence and sequence of presentation; no more than 1 mistake was made in explaining the

meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work

- 75-61 points - the student conducts a fairly independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic are brought. No more than 2 errors were made in the meaning or content of the problem, the design of the work

- 60-50 points - if the work is a retransmitted or completely rewritten source text without any comments, analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the disclosed problem and in the design of the work.

**Questions for colloquiums, interviews in the discipline «Modern manufacturing technologies for the manufacture and storage of food / Современные производственные технологии изготовления и хранения пищевой продукции»**

**Section "Food Biotechnology"**

1. Sections and objects of biotechnology.
2. Combined products based on raw materials of animal origin and their analogues.

**Section "Primary processing of livestock"**

1. Intravital factors determining the quality of meat.
2. Transportation, acceptance and keeping of animals.
3. Slaughter of animals and processing of meat carcasses.

**Section "Physicochemical and Biochemical Basics of the Production of Meat and Meat Products"**

1. Biochemistry of muscle tissue and blood.

2. Biochemistry of connective and adipose tissue.
3. Biochemistry of integumentary and nervous tissue.
4. Biochemistry of internal organs, endocrine and digestive glands.
5. The chemical composition of meat and its nutritional value. Physico-chemical changes in meat during cooling and storage.
6. Preservation of meat for storage.

### **Section "Biotechnology of meat products"**

1. Qualitative characteristic of meat.
2. Rational use of raw materials.
3. Meat emulsions.
4. Biotechnology of whole muscle and restructured products.
5. Biotechnology of raw smoked products.
6. Biotechnology of products from secondary protein raw materials.
7. Storage of meat products.
8. Defects in meat products.
9. Auxiliary materials for the production of meat products.
10. Labeling requirements for meat products.

### **Section "The use of microorganisms in the biotechnology of meat products"**

1. The use of bacterial cultures in the production of raw smoked meat products.
2. Biotechnology of raw smoked meat products using bacterial preparations.

#### **Evaluation Criteria**

- 100-86 points are awarded to the student, if the student knows and is fluent in the material, expressed his opinion on the formulated problem, argued for it. For preparation, the student uses not only lecture material, but also additional domestic and foreign literature.

- 85-76 - points - the work is characterized by semantic integrity, coherence and sequence of presentation. There are no actual errors related to understanding the problem.

- 75-61 points - the student understands the basic foundations and theoretical justification of the topic. The main sources on this topic are brought.

- 60-50 points - if the answer is a retransmitted source text, without any comments, analysis. Three or more than three errors were made in the semantic content of the topic.

**The method of compiling intelligence cards in the discipline «Modern manufacturing technologies for the manufacture and storage of food /  
Современные производственные технологии изготовления и хранения пищевой продукции»**

**1. Topic:** Biotechnology of smoked products.

**2. Concept:** Understanding the importance and role of microorganisms in creating smoked products.

**3. Expected results of the study:** students' development of creativity; the formation of communicative competence in the process of group activities for the compilation of intelligence cards; the formation of general academic competency related to the perception, processing and exchange of information; acceleration of the learning process.

**Evaluation Criteria**

- 100-86 points are given to the student if he takes an active part in drawing up the intellect of the map, shows deep knowledge on a given problem, actively expresses and defends his opinion, has high communicative abilities.

- 85-76 points are awarded to the student if he takes part in drawing up the intelligence of the map, but does not show deep knowledge on the given problem, expresses his opinion and tries to argue him.

- 75-61 points are awarded to the student if he does not accept or takes a passive part in compiling the intellect card. Shows weak knowledge on a given problem, unable to express his opinion.