MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION
Federal state autonomous educational institution
of higher education
**«Far Eastern Federal University»**
(FEFU)

**INSTITUTE OF LIFE SCIENCES AND BIOMEDICINE (SCHOOL)**

AGREED

Head of OP

Kalenik T.K.
(signature) (full name)
«28» September 2021 г.

APPROVE

Head of VSP

Kalenik T.K.
(signature) (full name)
«28» September 2021 г.

# WORKING PROGRAM OF THE DISCIPLINE

Design and organization of production of agri-food biotechnology
Direction of training 19.04.01 «Biotechnology»
(«Agri-Food Biotechnology»)
Form of training full-time

course 2 semester 3
lectures 18 hours.
practical classes 18 h.
laboratory work 00 hours.
including using
total classroom hours 36 hours.
independent work 18 h.
including preparation for the exam 54 hours (if the exam is provided).
control works (quantity) are not provided
term paper / term project provided
credit not included
exam 3 semester

The program of the state final certification was compiled in accordance with the requirements of the Federal State Educational Standard in the field of study 19.04.01 Biotechnology, approved by order of the Ministry of Science and Higher Education of the Russian Federation dated August 10, 2021 No. 737.

The program at the meeting of the Academic Council of the Institute of Life Sciences and Biomedicine (School) December 21, 2021
Director of the Department of Food Science and Technology Kalenik T.K.
Compiled by: Kalenik T.K., Kiseleva M.V.

**Reverse side of the title page of the RPMU**

**I. The work program was revised at the meeting of the department:**
Protocol dated «_____» _____ 20___ № _____
Director _____ _____
(signature) (full name)

**II. The work program was revised at the meeting of the department:**
Protocol dated «_____» _____ 20___ № _____
Director _____ _____
(signature) (full name)

**III. The work program was revised at the meeting of the department:**
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Director _____ _____
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**IV. The work program was revised at the meeting of the department:**
Protocol dated «_____» _____ 20___ № _____
Director _____ _____
(signature) (full name)

# ABSTRACT

**Master's degree in 19.04.01** Biotechnology

**Master's Program "Title"** Agrofood Biotechnology

**Course title:** Design and organization of production of agri-food biotechnology

**Variable part of Block 1, 3 credits**

**Instructor:** Semenyuta A.A.

**At the beginning of the course a student should be able to:**

- the ability to search, store, process and analyze information from various sources and databases, to represent it in the required format using the information, computer and network technologies;

- the ability to use modern methods and technologies (including information) in their professional activities.

**Learning outcomes:**

SPC – 8 ability to conduct technical and economic analysis of production and preparation of technical and economic documentation;

SPC – 9 willingness to use the basic principles of organization of the metrological assurance of production;

SPC – 14 the ability to use standard and develop new methods of engineering calculations of technological parameters and equipment of biotechnological production;

SPC – 17 willingness to conduct pilot technology testing and process scaling;

SPC – 22 The ability to coordinate the implementation of research results in production.

**Course description:** The study of discipline is aimed at preparing students for the production, design and research activities related to the processes of raw material processing in the high-tech equipment and the operation of machines and apparatus of food production needed to address the issues of professional production, analysis, transport and storage of finished products.

**Main course literature:**

1. Technological design of the plant for the production of protein-vitamin concentrate (BVK) in the conditions of agricultural enterprises: a teaching manual / G. E. Kokieva; Altai State Technical University. Ulan-Ude: Publishing House of the Buryat University, 2017. - 70 p. (1 copy) http://lib.dvfu.ru:8080/lib/item?id=chamo:848330&theme=FEFU

2. Slavyansky A.A. Designing enterprises of the industry: a textbook for universities .- M.: Forum, 2014. - 318 p. (10 copies) http://lib.dvfu.ru:8080/lib/item?id=chamo:736868&theme=FEFU

3. Organization of production: a textbook for universities in economic and technical specialties / R. A. Fatkhutdinov. Moscow: Infra-M, 2014. - 544 p. (2 copies) http://lib.dvfu.ru:8080/lib/item?id=chamo:751523&theme=FEFU

**Form of final knowledge control:** exam

## 1. Purpose and objectives of mastering the discipline:

**The purpose** of the discipline «Design and organization of production of agri-food biotechnology» is to prepare students for production, design activities related to the study of design organization, design documentation, rules for the selection and calculation of technological equipment, layout of workshops necessary for professional solving production issues and have an idea: on the basics of the design process for industry enterprises.

**Objectives** of the discipline are:

• the formation of students' knowledge system about the methods and stages of design;

• consolidate the design skills of food industry enterprises;

• mastering the design techniques of the technological part.

As a result of studying this discipline, the following professional competencies (elements of competencies) are formed in students.

| Code and wording of competency | Competency Stages | |
|---|---|---|
| SPC – 8 ability to conduct technical and economic analysis of production and preparation of technical and economic documentation | Knows | rules for drawing up technical and economic documentation for design |
| | Can | conduct a technical and economic analysis of production |
| | Owns | skills in the preparation of technical and economic documentation |
| SPC – 9 willingness to use the basic principles of organization of the metrological assurance of production | Knows | basic principles of organization of metrological support of production |
| | Can | use the basic principles of organization of metrological support of production |
| | Owns | skills to use the basic principles of organization of metrological support of production |
| SPC – 14 the ability to use standard and develop new methods of engineering calculations of technological parameters and equipment of biotechnological | Knows | methods of engineering calculations of technological parameters and equipment of biotechnological productions |
| | Can | design those. lines, choose modern tech. equipment; confirm by engineering calculations the compliance of the equipment with the conditions of those. process and production requirements |
| | Owns | the ability to use standard and develop new methods for engineering calculations of technological parameters and equipment for biotechnological production |

| | | |
|---|---|---|
| production | | |
| SPC – 17 willingness to conduct pilot technology testing and process scaling | Knows | ways to conduct pilot testing of technology and scaling processes |
| | Can | conduct pilot testing of technology |
| | Owns | skills in scaling technological processes |
| SPC – 22 The ability to coordinate the implementation of research results in production | Knows | ways to introduce the results of scientific research into production |
| | Can | apply methods of coordination of work on the implementation of the results of scientific research into production |
| | Owns | the ability to coordinate work on the implementation of scientific research results in production |

To form the above competencies within the discipline "Design and organization of production of agri-food biotechnology" the following methods of active / interactive training are used: lectures, press conferences, seminar and press conferences.

2. The complexity of the discipline and types of training sessions in the discipline

The total labor intensity of the discipline is 3 credit units (108 academic hours).

The types of training sessions and work of the student in the discipline can be:

| Designation | Types of training sessions and work of the student |
|---|---|
| Lec | Lectures |
| Lab | Labs |
| Pe | Practical exercises |
| Oc | Online course |
| SR | Independent work of the student during the period of theoretical training |
| Control | Independent work of the student and contact work of the student with the teacher during the period of intermediate certification |

Discipline structure:

The form of education is full-time.

| № | Section name disciplines | Semester | The number of hours by type of training sessions and work of the student | | | | | | Forms of intermediate certification, current monitoring of progress |
|---|---|---|---|---|---|---|---|---|---|
| | | | Lec | Lab | Pe | Oc | SR | Control | |
| 1 | Organization and design methods of food industry enterprises | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 2 | Stage and design stages | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 3 | Pre-design work | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 4 | Design work | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 5 | Designing of the technological part. Product calculation. The choice of technological scheme | 3 | 2 | | 2 | | 2 | 54 | Seminar, exam |
| 6 | Calculation of areas and layout of the main and auxiliary industries | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 7 | The general plan of the designed enterprise food industry | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 8 | Computer-aided design system (CAD) | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| 9 | Engineering support of the designed enterprises | 3 | 2 | | 2 | | 2 | | Seminar, exam |
| | Total: | | 18 | | 18 | | 18 | 54 | |

## 3.STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE

### Topic 1. Organization and design methods of food industry enterprises

Design organizations. Operational, economic, engineering, architectural requirements for buildings and structures. Food Enterprise Project. Basic design methods. Graphical method. Volumetric design. Flat design. Autonomous modular design. Computer aided design.

### Topic 2. Stage and design stages

Design stages. General design scheme of food industry enterprises. Design stages. One-step design. Two-stage design.

**Topic 3. Pre-design work**

Feasibility study. Design assignment. Technical project.

**Topic 4. Design work**

The purpose of the design. Work project. Reconstruction technical project. Re-engineering technical project. Technical project.

**Topic 5. Designing of the technological part. Product calculation. The choice of technological scheme**

Product calculation. Methods of grocery calculation. Schemes of the technological direction. Selection and justification of the technological scheme. The schedule of technological processes. Justification for the selection of technological schemes, flowcharts, their description and technical equipment. General requirements (technical and economic criteria) recommended when choosing a technological scheme. Hardware-technological scheme.

**Topic 6. Calculation of areas and layout of the main and auxiliary industries**

Layout. Layout plans. Basic layout requirements.

**Topic 7. The general plan of the designed enterprise food industry**

General plan. Design Standards. Project master plan. Construction master plan. Executive master plan. Tasks of the draft master plan. Rose of Wind. The layout of the site is made by zones: pre-factory, production, raw materials, expeditionary and economic. Explication of buildings and structures and calculation of technical and economic indicators. Production, utility, warehouse and administrative (auxiliary) premises, workshops and departments.

**Topic 8. Computer-aided design system (CAD)**

CAD is an organizational and technical system consisting of a set of design automation tools interconnected with design organization units and performing computer-aided design.

The complex of automation tools includes technical, informational, software, mathematical, informational, linguistic and organizational support. Stages of development and implementation of CAD. Block diagram of CAD.

**Topic 9. Engineering support of the designed enterprises**

Heat supply of the designed enterprises. Power supply of the designed enterprises. Cooling of designed enterprises. Water supply and sewerage of the designed enterprises.

## 4. STRUCTURE AND CONTENT OF THE PRACTICAL PART OF THE COURSE

### Practical lessons

**Lesson 1. General rules for the design and estimate documentation**

1. To study the guidelines for the implementation of the main inscription (stamp) in accordance with the SPDS system (according to GOST 21.103–78) in the drawings.

2. Perform on the standard sheets of drawing paper the main inscription (stamp) in accordance with the SPDS system (in accordance with GOST 21.103–78)

3. Perform the dimensions of the main inscription (stamp) and fill in the stamp.

**Lesson 2. Brief information about the main structural and architectural elements of the building using the active learning method - seminar-press conference**

Issues for discussion:

1. The main structural elements of buildings.

2. Terms and definitions of structural elements of buildings.

3. The main dimensional values used in the design of structural elements of buildings.

**Lesson 3. Preparation and design of technological schemes**

Issues for discussion:

1. Symbols of equipment types

2. Symbols of pipelines

3. Symbols for pipe fittings

4. Symbols of pumps and compressors (blowers)

5. Symbols of technological equipment

6. Symbols of heat exchangers

7. Designation of instrumentation on technological schemes

8. Functional designations of instrumentation

9. Functional designations of automation systems

10. Automatic regulation systems

**Lesson 4. General plan of the enterprise**

The order of execution, execution of work:

1. In accordance with the assignment, which is given by the teacher and represents the master plan of the food enterprise; it is necessary to analyze the plan, to decipher in the report the conventions adopted when plotting the plan.

2. Given the scale of the plan, draw up an explication of the plan in the report, determining the area of buildings, sites, etc. using measurements with a ruler.

3. To calculate the technical and economic indicators of the general plan and draw a conclusion about the advantages and disadvantages of the general plan under consideration.

4. Based on the results of work, each student draws up a report, which should contain:

• examples of symbols on the general plan with their interpretation;

• explication to the general plan;

• a table of technical and economic indicators of the general plan and calculations of their parameters;

• conclusions about the rationality of the general plan.

**Lesson 5. Layout of shops, sections, departments**

Practical part, work design:

Each student is given a layout plan for a real food company.

When performing work, it is necessary:

1. identify all units, shops, sections and departments included in the layout;

2. compile a table of functional relationships for the layout option;

3. make a schedule of functional relationships and draw up a schematic diagram of the layout;

4. Compare the principal (dimensionless) layout diagram with a given drawing; to identify the shortcomings of the layout and the possibilities of their elimination

Each student draws up an individual report, which should contain:

1. a description of the general principles of the layout of the shops of food enterprises;

2. a table of identified functional relationships;

3. The scheme of paired functional relationships;

4. an example of a dimensionless, schematic diagram of the layout;

5. a detailed analysis of the shortcomings of the layout of the scheme of a real enterprise.

**Lesson 6. Calculation of intra-workshop transport**

Practical part, work design:

1. For the options to calculate the required number of bogies, the performance of belt conveyors, the performance of auger, scraper, friction conveyors, elevators.

2. Each student draws up a report that must contain the results of the calculations.

## 5. TRAINING AND METHODOLOGICAL SUPPORT OF STUDENTS'S INDEPENDENT WORK

Educational and methodological support for students' independent work in the discipline Design and organization of production of agri-food biotechnology" 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.

## 6. 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 1. Organization and design methods of food industry enterprises | SPC-8<br>SPC-9<br>SPC-14<br>SPC-17<br>SPC-22 | Knows how to develop proposals for optimizing biotechnological processes and managing the release of biotechnological products | UO-1 - interview,<br>UO-2 - colloquium,<br>PR-4 - abstract | Exam Questions 1-9<br>Pr-1 - Final Test |
| | | | Able to apply methods for developing proposals for optimizing biotechnological processes and managing the release of biotechnological products | | |
| | | | Knows how to develop proposals for optimizing biotechnological processes and managing the release of biotechnological products | | |
| 2. | Topic 2. Stage and design stages | | Knows how to design and modernize biotechnological | UO-1 - interview,<br>UO-2 - | Exam Questions 10-13<br>Pr-1 - Final Test |

| | | | | | |
|---|---|---|---|---|---|
| | | | production<br>Able to apply methods of design and modernization of biotechnological production | colloquium, PR-4 - abstract | |
| 3. | Topic 3. Predesign work | | Owns methods of designing and modernizing biotechnological production | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 6-10 Pr-1 - Final Test |
| 4. | Topic 4. Design work | | | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 6-10 Pr-1 - Final Test |
| 5. | Topic 5. Designing of the technological part. Product calculation. The choice of technological scheme | | | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 14-21 38-40 Pr-1 - Final Test |
| 6. | Topic 6. Calculation of areas and layout of the main and auxiliary industries | | | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 22-30 Pr-1 - Final Test |
| 7. | Topic 7. The general plan of the designed enterprise food industry | | | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 14-16 Pr-1 - Final Test |
| 8. | Theme 8. Computer-aided design system | | | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 31-34 Pr-1 - Final Test |
| 9. | Theme 9. Engineering support of projected | | | UO-1 - interview, UO-2 - colloquium, PR-4 - abstract | Exam Questions 35-38 Pr-1 - Final Test |

Typical control tasks, methodological materials that determine the procedures for assessing knowledge, skills and (or) experience, as well as the criteria and indicators necessary for assessing knowledge, skills, and characterizing the stages

of formation of competencies in the process of developing an educational program are presented in the Appendix 2.

## 7. LIST OF TRAINING LITERATURE AND INFORMATION AND METHODOLOGICAL SUPPORT OF DISCIPLINE

### Main literature

*(electronic and print editions)*

1. Technological design of the workshop for the production of protein-vitamin concentrate (BVK) in the conditions of agricultural enterprises: a training manual / G. E. Kokieva; Altai State Technical University. Ulan-Ude: Publishing House of Buryat University, 2017 .-- 70 p. (1 copy) http://lib.dvfu.ru:8080/lib/item?id=chamo:848330&theme=FEFU

2. Slavic A.A. Designing industry enterprises: a textbook for high schools.- M.: Forum, 2014. - 318 p. (10 copies) http://lib.dvfu.ru:8080/lib/item?id=chamo:736868&theme=FEFU

3. Organization of production: a textbook for universities on economic and technical specialties / R. A. Fathutdinov. Moscow: Infra-M, 2014 .-- 544 p. (2 copies) http://lib.dvfu.ru:8080/lib/item?id=chamo:751523&theme=FEFU

### Additional literature

*(electronic and print editions)*

1. Romanova, N.K. Organization of production and service at public catering enterprises [Electronic resource]: textbook / N.K. Romanova, E.S. Selyu, O.A. Reshetnik. - The electron. Dan. - Kazan: KNITU, 2016 .-- 96 p. - Access mode: https://e.lanbook.com/book/102028.

2. Yastina, G.M. Design of public catering enterprises (with the basics of AutoCAD) [Electronic resource]: textbook / G.M. Yastina, S.V. Nesmelova. - The electron. Dan. - St. Petersburg:, 2014 .-- 288 p. - Access mode: https://e.lanbook.com/book/90689

3. Dubrovin, I.A. Economics and the organization of food production [Electronic resource]: textbook / I.A. Dubrovin, A.R. Yesina, I.P. Stukanova;

under. total ed. Dubrovina I.A. - Electron. Dan. - Moscow: Dashkov and K, 2018 .- - 228 p. - Access mode: https://e.lanbook.com/book/110734

4. Design, construction and engineering equipment of dairy industry enterprises [Electronic resource]: study guide / L.V. Golubeva [et al.]. - The electron. Dan. - St. Petersburg: Doe, 2015 .-- 416 p. - Access mode: https://e.lanbook.com/book/60036

5. Medvedev, P.V. Design of bakery enterprises [Electronic resource]: study guide / P.V. Medvedev, V.A. Fedotov, T.A. Bakhitov. - The electron. Dan. - Orenburg: OSU, 2016 .-- 104 p. - Access Mode: https://e.lanbook.com/book/110663

6. Design, fundamentals of industrial construction and engineering equipment of canning enterprises [Electronic resource]: textbook / N.V. Tymoshenko [et al.]. - The electron. Dan. - St. Petersburg: Doe, 2018 .-- 140 p. - Access mode: https://e.lanbook.com/book/107963

## 8. METHODOLOGICAL INSTRUCTIONS FOR THE DEVELOPMENT OF THE DISCIPLINE

The theoretical part of the discipline «Design and organization of production of agri-food biotechnology» is revealed at lectures, since 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.

In practical classes during discussions at seminars, during discussion of essays and in classes using active learning methods, students learn to analyze and predict the development of science on the design of enterprises in the agri-food and biotechnological industries, and reveal its scientific and social problems.

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 under study, to obtain basic skills in the selection of various technological equipment to ensure the technological process. 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 reasonably defend one's point of view, 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.

The main types of independent work are work with literary sources and guidelines for studying the organization of production, design and selection of equipment. The results of the work are drawn up in the form of abstracts or reports with subsequent discussion. Topics of essays correspond to the main sections of the course.

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

## 9. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Material and technical support for the implementation of the discipline includes lecture halls and practical classes, provided with multimedia equipment and corresponding to sanitary and opposite rules and norms.

Laboratory of General Biotechnology of Food Products. Vladivostok, about. Russian p. Ajax 10, Building 25.1, aud. M 311. The classroom for lectures,

practical and laboratory classes, group and individual consultations, ongoing monitoring and interim certification.

Training furniture for 25 workplaces, teacher's place (table, chair),

Analytical and technological equipment (M311): Milk centrifuge with heating ЦЛМ 1-12; Liquid thermostat LOIP Lt-208a, volume 8l, 120x150 / 200mm; Analyzer of milk quality Lactan 1-4 mod. 230; PH-millivolmeter 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.

Computer class: Vladivostok, about. Russian p. Ajax 10, Building 25.1, aud. M621. The classroom for lectures, practical exercises, group and individual consultations, ongoing monitoring and interim certification.

Training furniture for 17 workplaces, teacher's place (table, chair). 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).

For independent work of students, the following rooms can be used: Reading rooms of the FEFU Scientific Library with open access to the fund (building A - level 10).

Reading room equipment of the FEFU Scientific Library: HP All-in-One 400 All-in-One Monoblock 400 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.

## 10.VALUATION FUNDS

| Code and wording of competency | Competency Stages | |
|---|---|---|
| SPC – 8 ability to conduct technical and economic analysis of production and preparation of technical and economic documentation | Knows | rules for drawing up technical and economic documentation for design |
| | Can | conduct a technical and economic analysis of production |
| | Owns | skills in the preparation of technical and economic documentation |
| SPC – 9 willingness to use the basic principles of organization of the metrological assurance of production | Knows | basic principles of organization of metrological support of production |
| | Can | use the basic principles of organization of metrological support of production |
| | Owns | skills to use the basic principles of organization of metrological support of production |
| SPC – 14 the ability to use standard and develop new methods of engineering calculations of technological parameters and equipment of biotechnological production | Knows | methods of engineering calculations of technological parameters and equipment of biotechnological productions |
| | Can | design those. lines, choose modern tech. equipment; confirm by engineering calculations the compliance of the equipment with the conditions of those. process and production requirements |
| | Owns | the ability to use standard and develop new methods for engineering calculations of technological parameters and equipment for biotechnological production |
| SPC – 17 willingness to conduct pilot technology testing and process scaling | Knows | ways to conduct pilot testing of technology and scaling processes |
| | Can | conduct pilot testing of technology |
| | Owns | skills in scaling technological processes |

| | | |
|---|---|---|
| SPC – 22 The ability to coordinate the implementation of research results in production | Knows | ways to introduce the results of scientific research into production |
| | Can | apply methods of coordination of work on the implementation of the results of scientific research into production |
| | Owns | the ability to coordinate work on the implementation of scientific research results in production |

## Student Examination Criteria

| Points required to evaluate the final test | Credit score | Requirements for completed competencies in the student's oral response |
|---|---|---|
| 100-86 | "Excellent" | “Excellent” is exhibited to a student who has knowledge of the basic technological equipment, its classification, processes occurring on the equipment being studied. Able to successfully conduct the selection of technological equipment to ensure the organization processes and the technological process. |
| 85-76 | "Good" | “Good” is exposed to the student who has the knowledge of the educational program material, successfully fulfilling the tasks stipulated in the program, having mastered the basic literature recommended in the program. As a rule, the rating is “good” for students who have shown a systematic nature of knowledge in the discipline and are capable of independently replenishing and updating them in the course of further academic work and professional activity |
| 75-61 | "Satisfactorily" | “Satisfactory” deserves a student who has discovered the knowledge of the main educational program material in the amount necessary for further studies and upcoming work in the specialty, coping with the tasks stipulated by the program, familiar with the main literature recommended by the program, but having errors in the answer to the exam and when performing examination tasks, but possessing the necessary knowledge to eliminate them under the guidance of a teacher. |
| 60-0 | "Unsatisfactorily" | The assessment is unsatisfactory given to a student who does not know a significant part of the program material, makes significant mistakes, unsurely performs practical work with great difficulties and cannot continue training without additional classes in the relevant discipline. |

## Tasks for self-fulfillment

1. On a given topic, an analysis of the literature on the discipline under study should be carried out. Based on the developed material, a colloquium should be prepared and presented.

2. Writing an essay on a topic proposed by the teacher or independently selected by the student and agreed with the teacher.

3. Preparing a presentation using multimedia equipment.

## Methodical instructions for the implementation of the essay, course project

### Goals and objectives of the abstract, course project

The abstract (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 course project, which is a comprehensive study of the problem, the abstract is aimed at analyzing one or more scientific papers.

*The objectives* of writing an abstract 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 abstract 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 abstract 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 abstract 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 abstract 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 abstract and its assessment**

Abstracts 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 abstract, 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 abstracts**

1. Directions to be observed when developing enterprise projects
2. Types of projects.
3. The main stages of design.
4. General plan of the enterprise
5. Requirements of design standards for the expedition area.
6. Requirements of design standards for the raw material zone.
7. The composition of the industry.
8. The layout. Layout Requirements.
9. Space-planning decisions of industry enterprises incorporated in projects. Advantages and disadvantages of individual solutions.
10. Requirements for the placement of storage facilities.
11. Requirements for the placement of the main production departments and workshops.
12. Requirements for the placement of the main auxiliary production departments and premises.
13. Requirements for the placement of the main auxiliary facilities.
14. The layout of the equipment.
15. Methods of storage of raw materials in enterprises.
16. A set of automation tools.
17. The main stages of the development and implementation of CAD.
18. Components and subsystems of CAD.

19. Product calculation. The capacity of the enterprise. Selection and justification of the technological scheme.

20. The schedule of the technological process.

21. The choice of technological equipment.

**Recommended topics and a list of course projects**

1. The design of the workshop for the production of special soft drinks with a capacity of 800 liters per day.

2. The project of the workshop for the production of semi-finished meat products with a capacity of 1200 kg per day.

3. The design of the workshop for the production of confectionery products with a productivity of 5000 kg per day.

4. Project of a bakery production workshop with a capacity of 5200 kg per day.

5. Project of a workshop for the production of processed cheese with a capacity of 20,000 kg per day.

6. Design of a plant for the production of vegetable oil with a capacity of 18,000 liters per day.

7. Project of a workshop for the production of pasta with a productivity of 1800 kg per day.

8. Project of a canning workshop for processing fish with a productivity of 3 tubes per day.

9. The project of a canning workshop for processing meat with a capacity of 4 tubes per day.

10. Design of a jelly products workshop with a capacity of 20,000 kg per day.

**Questions for the exam**

1. The main directions that should be observed when developing enterprise projects

2. Organization and design methods of food enterprises.

3. Types of projects.

4. What is the difference between a technical re-equipment project and a reconstruction project?

5. What regulatory documents are used in the development of projects?

6. What are the stages of design.

7. What is a model project?

8. List the requirements for the location of enterprises.

9. What are the main stages of design.

10. What does the pre-design phase include?

11. Design work.

12. For what purpose is a feasibility study or fuel and energy complex carried out?

13. What are the main stages of design.

14. What does the pre-design phase include?

15. Design work.

16. For what purpose is a feasibility study or fuel and energy complex carried out?

17. Product calculation.

18. The capacity of the enterprise.

19. The selection and justification of the technological scheme.

20. The schedule of the technological process.Что такое компоновка?

21. Layout requirements.

22. What is a floor plan?

23. Space-planning decisions of industry enterprises incorporated in projects. Advantages and disadvantages of individual solutions.

24. Requirements for the placement of storage facilities.

25. Requirements for the placement of the main production departments and workshops.

26. Requirements for the placement of the main auxiliary production departments and premises.

27. Requirements for the placement of the main auxiliary premises.

28. Layout of equipment.

29. The general plan of the enterprise?

30. How is the site planning during the development of the general plan?

31. The requirements of the design standards for the expedition area.

32. Requirements for design standards for the raw material zone.

33. What can be located in the economic zone?

34. How are the density coefficients of development and use of the territory determined?

35. What should be the coefficient of building density?

36. The composition of the industry.

37. What branches and premises belong to auxiliary production?

38. The concept of CAD.

39. What is a complex of automation tools?

40. The main stages of the development and implementation of CAD.

41. Components and subsystems of CAD.

42. Examples of automation of management and control of production.

43. What is meant by the heat supply of enterprises?

## Final task

Task 1

Calculate the hourly capacity of the Sh2-KhPA-16 oven for the production of bread from rye flour of the 2nd grade.

Task 2

Calculate the hourly capacity of the Sh2-KhPA-25 furnace for the production of Borodino rolls baked on sheets.

Task 3

Calculate the daily consumption of raw materials for the production of 18.305 tons of Borodino bread.

Task 4

Calculate the amount of raw materials for the production of 8 tons of “mask” caramel, wrapped “in a twist”. Consumption of packaging materials in accordance with the “Design standards for confectionery enterprises” is: waxed paper for the label - 64.1 kg per 1 ton of product and for wrapping 20.0 kg per 1 ton. Recipe for Caramel Mask, taken from the Recipe for Caramel collection: granulated sugar is consumed per 1 ton of caramel - 919.99 kg; molasses - 564.0 kg; citric acid –9.21 kg; mint and pear essences - 4.0 kg each.

Task 5

Calculate the daily capacity of the pasta factory for individual groups of pasta, if the specified production capacity is 75.5 tons / day. Guided by the approximate percentage of the types of products recommended by the "Design standards for pasta enterprises."

Task 6

Calculate the production recipe for bread from wheat flour 2 varieties. The batch of semi-finished products is continuous, the method of preparing the dough is on large dense dough.

Task 7

Calculate the production recipe for whey rolls. The batch of dough is portioned, the method of preparing the dough is unpaired.

Task 8

We determine the need for raw materials for the production of 1000 kg of pasteurized milk with a mass fraction of fat of 3.2%.

Task 9

Calculate the product calculation of 1000 kg of fermented milk drink with a mass fraction of fat of 3.5%, packaged in bags of plastic film of 0.25 dm3.

Task 10

Product calculation sour cream. Calculate the need for raw materials for the production of sour cream with a mass fraction of fat of 20%, packaged in 0.5 kg polystyrene cups.

## II. Evaluation tools for ongoing certification

**Criteria for assessing the abstract, course project**

- 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.

**Guidelines for the preparation of presentations on the discipline** "Design and organization of production of agri-food biotechnology"

General requirements for presentation:

- The presentation should not be less than 10 slides;

- the first sheet is the title page on which the following must be presented: project name; surname, name, patronymic of the author;

- the next slide should be the content, which presents the main stages (moments) of the presentation; it is desirable that from the content by hyperlink you can go to the necessary page and return again to the content;

- ergonomic design requirements: color compatibility, a limited number of objects on a slide, text color;

- The last slides of the presentation should be a glossary and list of references.

**Presentation Subject**

1. The structure and classification of the main types of equipment.
2. Automation of food production processes.
3. The methodology for choosing the best option for technological equipment of food production.
4. Equipment for pasta enterprises.
5. Equipment for bakeries.
6. Equipment for sugar enterprises.
7. Equipment for fermentation plants.
8. Equipment for oil-fat production.
9. Equipment for canning production.
10. Equipment for starch and syrup production.
11. Confectionery equipment.
12. Equipment for primary processing of meat animals.
13. Equipment for sausage production.
14. Equipment for the production of semi-finished meat products.
15. Equipment for the fishing industry.
16. A systematic approach to the problem of the development of technological lines.
17. The structure of technological systems.
18. Technical and economic planning of repair work.

**Questions for colloquiums, interviews in the discipline** "Design and organization of production of agri-food biotechnology"

**Topic 1. Organization and design methods of food industry enterprises**

1. The main directions that should be observed when developing enterprise projects

2. Organization and design methods of food enterprises.

3. Types of projects.

4. What is the difference between a technical re-equipment project and a reconstruction project?

5. What regulatory documents are used in the development of projects?

**Topic 2. Stage and design stages**

1. What are the stages of design.

2. What is a model project?

3. List the requirements for the location of enterprises.

**Topic 3. Predesign work**

1. What are the main stages of design.

2. What does the pre-design phase include?

3. Design work.

4. For what purpose is a feasibility study or fuel and energy complex carried out?

**Topic 4. Design work**

1. What are the main stages of design.

2. What does the pre-design phase include?

3. Design work.

4. For what purpose is a feasibility study or fuel and energy complex carried out?

**Topic 5. Design of the technological part. Product calculation. The choice of technological scheme**

1. Product calculation.

2. The capacity of the enterprise.

3. The selection and justification of the technological scheme.

4. The schedule of the technological process.

**Topic 6. Calculation of areas and layout of the main and auxiliary industries**

1. What is the layout?

2. Layout requirements.

3. What is a floor plan?

4. Space-planning decisions of industry enterprises, laid down in projects. Advantages and disadvantages of individual solutions.

5. Requirements for the placement of storage facilities.

6. Requirements for the placement of the main production departments and workshops.

7. Requirements for the placement of the main auxiliary production departments and premises.

8. Requirements for the placement of the main auxiliary premises.

9. The layout of the equipment.

**Topic 7. General plan of the designed food industry enterprise**

1. The general plan of the enterprise?

2. How is the site planning during the development of the general plan?

3. Requirements for design standards for the expedition area.

4. The requirements of the design standards for the raw material zone.

5. What can be located in the economic zone?

6. How are the density coefficients of building and use of the territory determined?

7. What should be the coefficient of building density?

8. The composition of the industry.

9. What departments and premises belong to auxiliary production?

**Topic 8. Computer Aided Design (CAD)**

1. The concept of CAD.

2. What is a complex of automation tools?

3. The main stages of development and implementation of CAD.

4. Components and subsystems of CAD.

**Topic 9. Engineering support of the designed enterprises**

1. Examples of automation of management and control of production.

2. What is meant by the heat supply of enterprises?

**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.