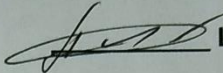


MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY
Department of Engineering Technologies of Food Production

"Approved"

Head of Department

 **L.G. Rozhkova**

« » _____ **2020**

CURRICULUM WORKING PROGRAM (SILABUS)

EK 4 Innovative engineering

Specialty: 181 "Food Technology"

Educational program: Food Technology

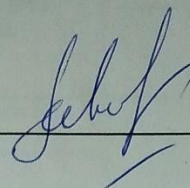
Faculty: Food Technologies

2020 - 2021 academic year

Work program on "Innovative Engineering" for students the especialty in 181 "Food Technology"

Developers:

Savchenko-Pererva M.Yu., Associate Professor, Ph.D.



The work program was approved at a meeting of the Department of Engineering Technologies of Food Production

Minutes of June 22, 2020 № 14

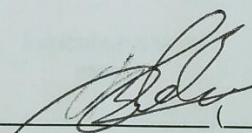
Head of the Department



Rozhkova L.G.

Agreed:

Guarantor of the educational program



Dean of the Faculty



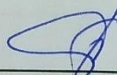
(Radchuk O.V.)

Dean of the Faculty



(Radchuk O.V.)

Methodist of the Department of Education Quality,
licensing and accreditation



Registered in the electronic database: date:

05.06

2020

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1. Description of the discipline:

Name of indicators	Field of knowledge, direction of training, educational and qualification level	Characteristics of the discipline
		Full-time education
Number of credits - 5	16 "Production and technology"	Normative
Modules - 2	Specialty: 181 "Food Technology"	Year of education:
Content modules: 3		2020-2021
		Course
		1m
		Semester
The total number of hours is 150		1
Weekly hours for full-time study: autumn semester classroom - 9 independent work of the student - 11	Educational level master	Lectures
		14
		Laboratory
		60
		Independent work
		76
		Individual tasks: MCW
		Type of control: Exam

Note.

The ratio of the number of hours of classroom classes to independent work is:%
for full-time education - 49/51

2. The purpose and objectives of the discipline:

The purpose Teaching the discipline "Innovative Engineering" is the training of highly qualified specialists who have mastered the theoretical and practical knowledge and skills of professional activity and are able to further deepen and expand them independently, using them in practice.

The main task study of the discipline "Innovative Engineering" - to provide students with the necessary knowledge related to the purpose, selection, location, operation, maintenance of technological equipment, for the implementation of the technological process in mini-food production in restaurants. And also to form in students systems of knowledge which are necessary for the specialist for introduction of new technics, complex mechanization of technological processes.

As a result of studying the academic discipline, the student will be able to demonstrate:

Professional competencies: the ability to plan and carry out scientific research using modern equipment, methods and specialized software in educational, research and / or production laboratories; the ability to organize production and practically implement scientific developments, taking into account energy efficiency and resource conservation and improving the quality indicators of food products; the ability to develop and implement commercial and scientific and technical projects in the field of food technology, taking into account technical, commercial, legal issues of labor and environmental protection; the ability to interpret the data obtained, prepare scientific reports, prepare scientific publications, present and discuss the results of scientific research and design solutions, including in a foreign language, at scientific seminars and conferences on the development of food technologies.

Learning outcomes: to organize the work of food industry enterprises and restaurant facilities in accordance with the requirements of life safety, resource conservation and environmental safety; apply special equipment, modern software, methods and techniques that are acceptable in certain branches of food technology, when performing scientific research in educational, scientific and industrial laboratories; plan and manage innovative scientific projects of fundamental and applied directions, taking into account the current state of science and technology in food technologies, conduct research, analyze the results obtained and draw conclusions; analyze and take into account in practice the trends in the scientific and technical development of food science, choose the most promising and optimal directions of scientific and technical activities; analyze and formalize the results of scientific and industrial tests in the form of scientific and technical documentation, scientific reports, titles of protection, articles, abstracts of scientific conferences.

According to the requirements of the educational and professional program, students must:

Know:

Basic technological schemes, technological equipment, rules of its operation, maintenance, mobility of mini-production, laboratory equipment, parameters of technological processes, ways to improve product quality with the use of advanced technologies of food production.

Basic rules of technology withoutpacks, sanitary ware at mini-factories.

The main technical and economic indicators of the mini-plant in comparison with full-scale production; supply of raw materials and sales.

The most promising and rational areas of scientific and technical activities.

Be able:

Apply special equipment, modern software, methods and techniques that are acceptable in certain areas of food technology, when performing research in training, research and production laboratories.

Plan and manage innovative research projects of fundamental and applied direction taking into account the current state of science and technology in food technology, conduct research, analyze the results and draw conclusions.

Analyze and formalize the results of scientific and production tests in the form of scientific and technical documentation, scientific reports, security documents, articles, abstracts of scientific conferences.

Carry out selection of technological equipment for mini-enterprises according to the technological scheme.

Perform work on installation and connection of technological equipment to the network.

Perform commissioning of technological equipment of mini-productions.

Perform technological calculations of machines, use control devices.

3. The curriculum of the discipline is being tested

Module 1. The essence of innovative engineering, its focus and main characteristics. Organization of laboratory work. Types of laboratory equipment by purpose

Content module 1. The concept of Innovative Engineering. The main activity and directions of Innovative Engineering. Organization of laboratory work. Safety precautions. Types of laboratory equipment.

Topic 1. The concept of Innovative Engineering. The main activity and directions of Innovative Engineering. Characteristics of innovative engineering: Engineering by types of functions, in resource provision of activity. Innovations in technological design. Feasibility study of innovative projects. Modeling of technological operations. Ways of optimization and innovative approaches to the design of functional groups of premises. Innovative principles of equipment use. Modern approaches to modernization of production and evaluation of their efficiency. Optimization of technological processes. The main stages of technology introduction into production. Modern approaches to the selection of resources to ensure production. Evaluation of the effectiveness of technology implementation in production. Workforce optimization. The main directions of rationalization of labor organization. The main stages of observation and data processing. Evaluation of the effectiveness of decisions on work optimization.

Topic 2. Organization of laboratory work. Safety precautions. Types of laboratory equipment.

Requirements for laboratory premises. Basic safety rules when working in a biochemical laboratory. Precautions. About reagents and their handling. Special laboratory furniture, laboratory fume cupboards, drying cabinets, laboratory thermostats, laboratory refrigerators, Petri dishes, titrators, magnetic stirrers (many of which are heated), scales (technical, analytical), laboratory centrifuges, pH meters, spectrophotometers, photometers homogenizers, sets of laboratory glassware: measuring cylinders, flasks, beakers, dosing pipettes, etc., automatic dispensers (automatic pipettes), automated sieves, digital polarimeters, laboratory refractometers, mechanical shaking systems (various, including orbital), rotary evaporators solvent cleaning systems, systems for solid - phase extraction, sets for thin - layer chromatography (sometimes with automatic application systems and automatic densitometers), special irradiating devices for viewing thin - layer plates, special extraction systems, air conditioners, systems for very efficient water purification (distillers, biodistillers; which purify water by ultraviolet light), autoclaves, electronic thermometers, extractors, dishwasher, low-temperature freezers, scales for measuring humidity when dried by IR light, electronic humidity and temperature meters, holders, tripods, feet, mounting equipment, water jets . Measuring devices: psychrometers, hygrometers, manometers, thermometers, microscopes, laboratory scales, polarimeters, spectrometers, refractometers, etc. IR Four there are spectrometers, gas and high-performance liquid chromatographs, mass spectrometers, spectrophotometers and spectrofluorimeters, polarimeters and refractometers, thickness gauges, hygrometers, rheometers, etc. Analytical laboratory equipment, test laboratory equipment.

Module 2. Equipment of mini-shops in the areas of food production

Content module 2. Equipment of mini-shops for the production of sausages and semi-finished products, for the production of dairy products.

Topic 3. Equipment for mini-shops for the production of sausages

Classification of meat processing enterprises. Apparatus-technological scheme of production of sausage products of low-power enterprise.

Equipment for medium and fine grinding of raw meat (wolves, cutters, spy cutters). Structure, principle of operation and rules of safe operation. Equipment for grinding raw meat (colloid mills, emulsifiers, homogenizers). Equipment for the formation of sausages - syringes. Equipment and technology of liquid smoke production. Structure, principle of operation, rules of operation.

Topic 4. Equipment for mini-shops for the production of semi-finished products.

Apparatus-technological scheme of production of cut semi-finished products, equipment used in it. Structure, principle of operation and rules of safe operation. Technological calculations of production lines for the production of semi-finished products. Equipment of production lines for the production of dumplings. Equipment of production lines for the production of pancakes with meat, pies with fillings, potato chips. Structure, principle of operation, rules of operation

Topic 5. Equipment for mini-shops for the production of dairy products.

Equipment for receiving, cooling and storing milk. Equipment for separating and purifying milk. Structure, principle of operation and rules of safe operation of equipment of production lines for the production of dairy products. Lines for the production of sour milk products (cheese, kefir, sour cream). Structure, principle of operation and rules of safe operation.

Equipment of production lines of mini-shops for the production of butter by beating. Equipment for the production of sour milk drinks (cheese baths, open and closed cheese coolers). Structure, principle of operation, rules of operation.

Content module 3. Equipment of mini-shops for beer production and processing of fruit and vegetable products.

Topic 6. Equipment of mini-shops for beer production.

Machine-equipment scheme of a mini-brewery. Equipment for grinding malt and unsweetened barley. Structure, principle of operation and rules of safe operation of production lines for beer production. Equipment of the mash-drying and filtering department of the mini-brewery. Equipment for the department of fermentation, fermentation and maturation of beer. Refrigeration equipment of technological lines of breweries. Equipment of technological lines of mini-complexes for the production of soft drinks (compotes, fruit juices). Structure, principle of operation, rules of operation.

Topic 7. Equipment of mini-shops for processing of fruit and vegetable products.

Equipment of an automated line of a mini-complex for processing tomatoes and cucumbers. Equipment of the automated line of a minicomplex for drying of fruit and vegetable production. Structure, principle of operation and rules of safe operation of production lines for processing and drying of fruit and vegetable products. Equipment of production lines for the production of tomato paste, fruit and vegetable purees. Equipment of production lines for canning green peas. Structure, principle of operation, rules of operation.

4. The structure of the discipline

Names of content modules and topics	Number of hours				
	Full-time				
	Together	including			
l		lab	ind	i.w.	
1	2	3	5	6	7
Module 1. The essence of innovative engineering, its focus and main characteristics. Organization of laboratory work. Types of laboratory equipment by purpose					
<i>Content module 1. The concept of Innovative Engineering. The main activity and directions of Innovative Engineering. Organization of laboratory work. Safety precautions. Types of laboratory equipment.</i>					
Topic 1. The concept of Innovative Engineering. The main activity and directions of Innovative Engineering.	22	2	10		10
Topic 2. Organization of laboratory work. Safety precautions. Types of laboratory equipment.	38	2	20		16
Together on the content module 1	60	4	30		26
Together for module 1	60	4	30		26
Module 2. Equipment of mini-shops in the areas of food production					
<i>Content module 2. Equipment of mini-shops for the production of sausages and semi-finished products, for the production of dairy products</i>					
Topic 3. Equipment for mini-shops for the production of sausages	22	2	10		10
Topic 4. Equipment for mini-shops for the production of semi-finished products.	18	2	2		14
Topic 5. Equipment for mini-shops for the production of dairy products.	24	2	10		12
Together on the content module 2	64	6	22		36
<i>Content module 3. Equipment of mini-shops for beer production and processing of fruit and vegetable products</i>					
Topic 6. Equipment of mini-shops for beer production.	12	2	4		6
Topic 7. Equipment of mini-shops for processing of fruit and vegetable products.	14	2	4		8
Together on the content module 3	26	4	8	MCW	14
Together for module 2	96	10	30		56

Total hours	150	14	60		76

5. Topics and plan of lectures.

№ s / n	Name topics	Number hours
1	<p>Topic 1. The concept of Innovative Engineering. The main activity and directions of Innovative Engineering.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. The purpose of studying the discipline. 2. Tasks of discipline. 3. General characteristics of innovative engineering. 	2
2	<p>Topic 2. Organization of the laboratory. Safety precautions. Types of laboratory equipment.</p> <p>Plan:</p> <ol style="list-style-type: none"> 1. Basic safety rules when working in a biochemical laboratory. 2. Reagents and their handling 3. Laboratory equipment 	2
3	<p>Topic 3. Equipment for mini-shops for the production of sausages.</p> <p>Plan:</p> <ol style="list-style-type: none"> 1. Classification of meat processing enterprises. 2. Apparatus-technological scheme of production of sausage products of low-power enterprise. 3. Equipment for medium and fine grinding of raw meat (wolves, cutters, spy cutters). 4. Structure, principle of operation and rules of safe operation. 	2
4	<p>Topic 4. Equipment for mini-shops for the production of semi-finished products.</p> <p>Plan:</p> <ol style="list-style-type: none"> 1. Apparatus-technological scheme of production of cut semi-finished products, equipment used in it. 2. Structure, principle of operation and rules of safe operation. 3. Technological calculations of production lines for the production of semi-finished products. 	2
5	<p>Topic 5. Equipment for mini-shops for dairy production products.</p> <p>Plan:</p> <ol style="list-style-type: none"> 1. Equipment for receiving, cooling and storing milk. 2. Equipment for separation and purification of milk. 3. Structure, principle of operation and rules of safe operation of equipment of production lines for the production of dairy products. 4. Lines for the production of fermented milk products (cheese, kefir, sour cream). 5. Structure, principle of operation and rules of safe operation. 	2
6	<p>Topic 6. Equipment of mini-shops for beer production.</p> <p>Plan:</p> <ol style="list-style-type: none"> 1. Machine-equipment scheme of a mini-brewery. 2. Equipment for grinding malt and unsweetened barley. 3. Structure, principle of operation and rules of safe operation of production lines for beer production. 4. Equipment of the mash and brewing department of the mini-brewery. 	2
7	<p>Topic7. Equipment of mini-shops for processing of fruit and vegetable products.</p> <p>Plan:</p> <ol style="list-style-type: none"> 1. Equipment of the automated line of the mini-complex for processing of tomatoes and cucumbers. 2. Equipment of the automated line of the mini-complex for drying of fruit and vegetable products. 	2

	3. Structure, principle of operation and rules of safe operation of production lines for processing and drying of fruit and vegetable products.	
	Together	14

6. Topics of laboratory classes

Ne n / o	Name topics	Number hours
1	Innovative approaches to technological design of food enterprises	2
2	Feasibility study of innovative projects and modeling of technological operations	2
3	Innovative principles of equipment use	2
4	Optimization of technological processes	2
5	Workforce optimization	2
6	Study of the principle of operation and rules of operation of special laboratory furniture, laboratory fume cupboards, drying cabinets, laboratory thermostats, laboratory refrigerators	2
7	Study of the principle of operation and rules of operation of Petri dishes, titrators, magnetic stirrers (many of which are heated), scales (technical, analytical), laboratory centrifuges	2
8	Study of the principle of operation and rules of operation of pH meters, spectrophotometers, photometers, homogenizers	2
9	Study of the principle of operation and rules of operation of sets of laboratory ware: measuring cylinders, flasks, chemical glasses, dosing pipettes, etc., automatic batchers (automatic pipettes), automated sieves	2
10	Study of the principle of operation and rules of operation of digital polarimeters, laboratory refractometers, mechanical shaking systems (various, including orbital), rotary evaporators, viscometers, solvent cleaning systems.	2
11	Study of the principle of operation and rules of operation of systems for solid-phase extraction, sets for thin-layer chromatography (sometimes with automatic application systems and automatic densitometers), special irradiating devices for viewing thin-layer plates, special hood systems, air conditioners	2
12	Study of the principle of operation and rules of operation of systems for very efficient water purification (distillers, bidistillators; deionizers; systems that purify water with ultraviolet light)	2
13	Study of the principle of operation and rules of operation of autoclaves, electronic thermometers, extractors	2
14	Study of the principle of operation and rules of operation of a dishwasher, low-temperature freezers, scales for measuring humidity when drying with IR light, electronic humidity and temperature meters, holders, tripods, feet, mounting equipment, water jet pumps, freeze drying.	2
15	Measuring devices: psychrometers, hygrometers, manometers, thermometers, microscopes, laboratory scales, polarimeters, spectrometers, refractometers, etc. IR-Fourier spectrometers, gas and high-performance liquid chromatographs, mass spectrometers, spectrophotometers and spectrofluorimeters, polarimeters and refractometers, thickness gauges, hygrometers, rheometers, etc. Study of the principle of operation and rules of operation	2
16	Study of the structure, principle of operation, rules of operation of mini-shop equipment for medium grinding of raw meat. Wolves. Spy cutters Engineering and technological calculations.	2
17	Study of the structure, principle of operation, rules of operation of the equipment of mini-shops for fine grinding of raw materials. Cutters, emulsifiers, colloid mills. Engineering and technological calculations,	2
18	Study of the structure, principle of operation, rules of operation of mini-shop equipment for mixing and formation of raw meat. Engineering and technological calculations of syringes.	2
19	Study of the structure, principle of operation, rules of operation of mini-shop equipment for cooking sausages and meat products. Engineering and technological calculations of cooking boilers.	2

20	Study of the structure, principle of operation, rules of operation of mini-shop equipment for baking and smoking of sausages and meat products. Engineering and technological calculations of smoking chambers and smoke generators.	2
21	Study of the structure, principle of operation, rules of operation of mini-shop equipment for the production of semi-finished products. Making cutlets and dumplings. Engineering and technological calculations of cutlet forming machines.	2
22	Study of the structure, principle of operation, rules of operation of equipment of mini-shops for milk storage.	2
23	Study of the structure, principle of operation, rules of operation of pasteurization and cooling plants.	2
24	Study of the structure, principle of operation, operating rules, technical characteristics of separators and equipment of mini-shops for the production of butter by beating	2
25	Study of the structure, principle of operation, rules of operation of the equipment of mini-shops for the production of sour milk cheese.	2
26	Study of the structure, principle of operation, operating rules, technical characteristics of the equipment of mini-shops for the production of sour milk drinks	2
27	Study of the structure, principle of operation, rules of operation of malt crushing, mash-wort and filtering equipment in the technological lines of breweries.	2
28	Study of the structure, principle of operation, rules of operation of equipment for fermentation and fermentation in the technological lines of breweries	2
29	Study of the structure, principle of operation, rules of operation of the equipment of mini-shops for processing of tomatoes and the equipment of the automated line for canning of fruit and vegetable production (green peas)	2
30	Study of the structure, principle of operation, rules of operation of the equipment of the pizza cooking line and the equipment of the automated crispy potato cooking line (chips).	2
	Together	60

7. Independent work

№ n / o	Name topics	Number hours
1	Topic 1. The concept of Innovative Engineering. The main activity and directions of Innovative Engineering. 1. Ways of optimization and innovative approaches to the design of functional groups of premises 2. Modern approaches to modernization of production and evaluation their effectiveness 3. The main directions of rationalization of labor organization. The main stages of observation and data processing. 4. Evaluation of the effectiveness of decisions on work optimization.	10
2	Topic 2. Organization of the laboratory. Safety precautions. Types of laboratory equipment. 1. Requirements for laboratory premises. 2. Precautions. 3. General laboratory equipment 4. Special laboratory equipment 5. Measuring instruments 6. Analytical laboratory equipment 7. Testing laboratory equipment.	16
3	Topic 3. Equipment for mini-shops for the production of sausages 1. Structure, principle of operation and rules of safe operation of equipment for grinding raw meat (colloid mills, emulsifiers, homogenizers). 2. Equipment for the formation of sausages - syringes. 3. Equipment and technology of liquid smoke production. Structure, principle of operation, rules of operation.	10

4	Topic 4. Equipment for mini-shops for the production of semi-finished products. 1. Equipment of production lines for the production of dumplings. 2. Equipment of production lines for the production of pancakes with meat, pies with fillings, potato chips. Structure, principle of operation, rules of operation	14
5	Topic 5. Equipment for mini-shops for the production of dairy products. 1. Equipment of production lines of mini-shops for the production of butter by beating. 2. Equipment for the production of sour milk drinks (cheese baths, open and closed cheese coolers). Structure, principle of operation, rules of operation.	12
6	Topic 6. Equipment of mini-shops for beer production. 1. Equipment for the department of fermentation, fermentation and maturation of beer. 2. Refrigeration equipment of technological lines of breweries. 3. Equipment of technological lines of mini-complexes for the production of soft drinks (compotes, fruit juices). Structure, principle of operation, rules of operation.	6
7	Topic 7. Equipment of mini-shops for processing of fruit and vegetable products. 1. Equipment of production lines for the production of tomato paste, fruit and vegetable purees. 2. Equipment of production lines for conservation of green peas. Structure, principle of operation, rules of operation.	8
	Together	76

8. Teaching methods

1. Methods of teaching by source of knowledge:

1.1. Verbal: story, explanation, conversation, lecture, instruction, work with a book (reading, taking notes, developing graphics).

1.2. Visual: demonstration, observation

1.3. Practical: laboratory method, practical work.

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

Analytical

Methods of synthesis

Inductive method

3. Methods of teaching the nature and level of independent mental *student activities*.

Partial search (heuristic)

Explanatory and demonstrative

4. Active teaching methods - the use of technical teaching aids, brainstorming, debates, excursions, the use of training and control tests, the use of reference notes of lectures.

5 Interactive learning technologies - the use of multimedia technologies, interactive whiteboards.

9. Control methods

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

2. Carrying out intermediate control during the semester.

3. Polycriteria assessment of current work of students:

the level of knowledge demonstrated in practical and laboratory classes

activity during the discussion of issues raised in class;

results of performance and protection of laboratory works;

independent elaboration of the topic as a whole or individual issues;

performance of analytical and calculation tasks;

test results;

written assignments during tests.

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

10. Distribution of points received by students

Type of control - "Exam"

Current testing and independent work								Together for modules and independent work	Attestation	Exam	Total
Module 1 - 20 points				Module 2 - 20 points							
T1	T2	T3	T4	T5	T6	T7	T8				
5	5	5	5	5	5	5	5	55 (40+15)	15	30	100

Distribution of points for the performance of modular course work

explanatory note	Illustrative part	Work protection	Sum
up to 50	to 20	to 30	100

Assessment scale: national and ECTS

The sum of points for all types of educational activities	ECTS assessment	Score on a national scale	
		for exam, course project (work), practice	for offset
90 - 100	A	perfectly	credited
82-89	B	fine	
75-81	C		
69-74	D		
60-68	E	satisfactorily	
35-59	FX	unsatisfactory with the possibility of reassembly	not credited with the possibility of re-assembly
0-34	F	unsatisfactory with mandatory re-study of the discipline	not enrolled with mandatory re-study of the discipline

11. Recommended literature

Basic

1. Reference syllabus of lectures of the discipline "Innovative engineering in the restaurant industry" for students majoring in 8.05170112 "Food Technology" educational and qualification level master of full-time education [Electronic resource] / compilers Goralchuk AB, Nagorny OY, Kotlyar O. IN. - Electron. data. - H : KhDUHT, 2016. - 1 electron. wholesale disk (CD-ROM); 12 cm. - Name from the title. screen.

2. Technique of laboratory works. Alexandrova KV, Bilokon LE, Makoid OB Under the general editorship of the head. Department of Biochemistry and Laboratory Diagnostics, Ph.D., prof. Alexandrova KV Zaporozhye, 2014. - P. 164

3. VA Domaretsky, PL Shiyan, MM Kalakura, LF Romanenko, LM Khomichak, etc .. "General technologies of food production" Kyiv, University "Ukraine", 2010, -814 with.

4.V.F. Dotsenko. Equipment for restaurants / Dotsenko VF, Gubenya VO, - Kyiv: Condor - Publishing House, 2016. -636 p.

5.G.O. Yeresko Technological equipment of dairy productions / Yeresko GO, Shinkaryk MM, Voroshchuk VY; Kyiv, firm "INOX" 2007, -338 p.

6.OV Gvozdev, F. Yu. Yalpachik, Yu. L. Rogach, DM Kyurcheva. "Technological equipment for processing livestock products", Sumy, "ENVIRONMENT" 2004, -420 p.

7. OV Datsyshyn, OV Gvozdev, F. Yu. Yalpachyk, Yu. P. Rohach "Mechanization of processing and storage of fruit and vegetable products", Kyiv, "META" 2003, -288 p.

8.GV Deinichenko, VO Yefimova, GM Postnov Equipment of food enterprises .: Handbook. In 3 4. Kharkiv, State Enterprise "World of Technology", 2002. - 256 p.

9.GI Podpryatov, LF SkaletskayaA. M. Senkov, VS Khilevych "Storage and processing of crop products" Kyiv, "META" 2002, -496 p.

Auxiliary

1. M.I. Botov, VD Elkhina, OM Golovanov "Thermal and mechanical equipment of trade and catering enterprises", M., ACADEMA, - 2003, -230 p.

2. MA Goncharov, AZ Sazonov, VI Tolkachov "My bakery" Kharkov, "Fact" -2002, -258 p.

3. V.G. Tikhomirov Technology and organization of brewing and non-alcoholic production / VG Tikhomirov, - M .; Kolos Publishing House, 2007, - 461 p.

4. M.P. Grave Equipment of public catering establishments: Thermal equipment. Textbook. manual for students of higher education. institutions / MP Mogilny, TV Kalashnova, A.Yu. Balasanyan; Ed. MP Mogilny, 2nd ed., Ster. –M .; Publishing Center "Academy", 2005.-192 p.

5.A.M. Shalygina General technology of milk and dairy products. Textbook. for universities / AM Shalygina, VM Kalinina, M., Kolos Publishing House, 2007, -200 p.

6. V.M. Kalinina Technical equipment and labor protection in public catering./ Textbook for SSUZ, Mastery, -2004, -432 p.

12. Information resources

1. Professional industrial food equipment for hotel and restaurant business. maresto.com.ua

2. Thermal equipment for restaurants and catering establishments

torgoborud.com.ua/ua/Teplove-obladnannya.html

3. Equipment for restaurant, cafe, bar, fast food, dining rooms. Equipment for public catering establishments. orest.ua

4. Refrigeration equipment for catering establishments. Equipment for pizzerias. Pizza ovens on firewood. diana-west.com.ua