

HIGHER EDUCATIONAL INSTITUTION OF UKOOSPILKA
« POLTAVA UNIVERSITY OF ECONOMICS AND TRADE »
Educational and research institute of full-time education
Department of Food Production and Restaurant Business Technologies

SYLLABUS
of the discipline
«Design of biotechnology production facilities»
for the 2022-2023 academic year

Course and semester of study	4th year, 8th semester
Educational program/specialization	«Biotechnology»
Specialty	162 Biotechnology and bioengineering
Field of expertise	16 Biotechnology
Degree of higher education	bachelor

Full Name, who leads this discipline
scientific degree and scientific title,
position

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Schedule of training sessions	http://schedule.puet.edu.ua/
Consultations	face-to-face http://www.thvrg.puet.edu.ua/cont.php online: by e-mail, Mon-Fri from 10.00-17.00
Distance learning course page	https://el.puet.edu.ua/

Description of the discipline

The purpose of studying the discipline	Acquiring theoretical knowledge and practical skills in developing optimal technological schemes of production processes, performing technological calculations of warehouse, production, administrative and other groups of premises. Acquisition of professional imaginative thinking and the necessary theoretical knowledge and practical skills related to the peculiarities of complex design developments of innovative production technologies; technical and technological bases of complex design developments of enterprises using CAD.
Duration	8th semester: 3 ECTS credits/90 hours (lectures 16 hours, practical training 20 hours, independent work 54 hours);
Forms and methods of training	Lectures and practical classes in the classroom, independent work outside the schedule
System of current and final control	Current control: attendance at classes; academic work in practical classes; defense of homework; individual assignments; independent work on preparation for classes and homework; current module tests Final control: semester 8 - credit.
Basic knowledge	Knowledge of the disciplines "Technology of bioproduction"; "Quality control and safety of industry products", "Economics and organization of biotechnology production"; "Fundamentals of labor protection". This discipline is a basic one for the qualification thesis.
Language of instruction	English

List of competencies provided by this discipline, program learning outcomes

Competencies to be acquired by the student	Program learning outcomes
Special (professional, subject) competencies	
Ability to analyze regulatory documents necessary for the implementation of engineering activities in the field of biotechnology	<p>Be able to apply the provisions of regulatory documents governing the procedure for product certification, production certification, requirements for the organization of quality management systems at enterprises, rules for the preparation of technical documentation and technological process based on the knowledge gained during practical training.</p> <p>Be able to analyze regulatory documents (state and industry standards, technical specifications, guidelines, etc.), prepare separate sections of technological documentation for biotechnological products for various purposes, analyze technological situations, and choose rational technological solutions.</p>
Consideration of the commercial and economic context in the design of biotechnology production facilities for various purposes.	Be able to conduct a feasibility study for biotechnology and pharmaceutical production (determining the need for the target product and calculating production capacity).
Ability to use methodologies for designing the production of biotechnology products for various purposes.	<p>Be able to apply modern mathematical methods to solve practical problems related to the research and design of biotechnological processes. Use knowledge of physics to analyze biotechnological processes.</p> <p>Based on the knowledge of the laws of mechanical,</p>

Competencies to be acquired by the student	Program learning outcomes
	<p>hydromechanical, heat and mass transfer processes and basic design features, be able to select appropriate equipment in the design of biotechnology and pharmaceutical production to ensure their maximum efficiency.</p> <p>Based on the knowledge gained during internships at enterprises and institutions, be able to perform product calculations and calculations of technological equipment.</p> <p>Be able to draw up a material balance sheet for one cycle of the production process, equipment specification and a stage control map with production control points.</p>
Ability to apply in practice the methods and means of computer-aided design of biotechnology products for various purposes	<p>Be able to justify and select appropriate technological equipment and graphically represent the technological process in accordance with the requirements of regulatory documents.</p> <p>Use computer-aided design systems to develop technological and hardware schemes for biotechnology production</p>
Ability to use modern automated control systems for biotechnology and pharmaceutical production, their technical, algorithmic, information and software to solve professional problems	Be able to formulate tasks for the development of production systems for biotechnological products for various purposes

Thematic plan of the discipline

Topic title	Types of work	Tasks for independent work by topic
Module 1: The concept of design. Fundamentals of process design		
<p style="text-align: center;">Topic 1. The concept of design. Technical and economic justification of the project Lecture 1. Basic concepts of design</p> <ol style="list-style-type: none"> 1. Organization and methods of enterprise design. 2. Technical documentation and its composition. Stages and phases of design. 3. Feasibility study of the project 	<p style="text-align: center;">Practical lesson 1. Feasibility study of the project</p> <ol style="list-style-type: none"> 1. Regulatory framework for design 2. Collecting initial data and drawing up a design task <p style="text-align: center;">Practical lesson 2. Preparing a balance sheet of raw materials for biotechnology companies</p> <ol style="list-style-type: none"> 1. Drawing up a balance sheet of raw materials for enterprises 2. Creating a balance of resources and labor. 	<p>Study the regulatory and technical literature in the field of construction. Make a list of documents</p>
<p style="text-align: center;">Theme 2 Basics of technological process</p>	<p style="text-align: center;">Practical lesson 3. Designing the technology of a food</p>	Study regulatory and technical literature in the

<p style="text-align: center;">design</p> <p>Lecture 2: Designing the technology of a bakery enterprise</p> <ol style="list-style-type: none"> 1. Regulatory framework for the design of food enterprises 2. The concept of assortment and methods of its selection 3. Criteria for selecting and designing production flow charts 4. Production control and waste management. <p>Lecture 3: Product calculations</p> <ol style="list-style-type: none"> 1. General principles of drawing up the material balance sheet of a food enterprise 2. Technological calculations of raw material requirements. 3. Calculations of needs for basic and auxiliary raw materials 	<p style="text-align: center;">enterprise</p> <ol style="list-style-type: none"> 1. The concepts of consumption rates, product yields, loss rates, and production waste. 2. Design of technological production schemes <p style="text-align: center;">Practical lesson 4. Technological calculations of production.</p> <ol style="list-style-type: none"> 1. Calculation of the production program. 2. Product calculation of food production. 	<p>field of technological processes. Familiarize yourself with recipe books.</p>
<p style="text-align: center;">Topic 3. Designing the equipment of a food enterprise and providing it with labor.</p> <p>Lecture 4. Selection and calculation of technological equipment and labor force</p> <ol style="list-style-type: none"> 1. Selection criteria for process equipment for main and auxiliary processes 2. Selection and calculation of technological equipment, basic principles and requirements for its placement. 3. Methods and ways to determine the number of employees of an enterprise. 	<p style="text-align: center;">Practical lesson 5. Selection and calculation of technological equipment</p> <ol style="list-style-type: none"> 1. Calculation of continuous equipment for production lines 2. Calculation of batch equipment. 3. Scheduling of equipment operation <p style="text-align: center;">Practical lesson 6 Calculating the number of industrial and production personnel</p> <ol style="list-style-type: none"> 1. Calculating the number of manual laborers. 2. Calculation of the number of employees of mechanized labor 3. Calculation of the number of auxiliary and support employees 	<p>Draw up a task for individual work according to the received option. Select the assortment, production technology and draw up a technological scheme according to the selected assortment.</p>
Module 2 Enterprise design		
<p style="text-align: center;">Topic 4. Design of production facilities</p> <p>Lecture 5. Design of production facilities</p> <ol style="list-style-type: none"> 1. Classification of industrial enterprise areas and methods of their calculation 2. Layout of production areas and workshops at the enterprise. Model and layout design 	<p style="text-align: center;">Practical lesson 7 Calculation of production areas.</p> <ol style="list-style-type: none"> 1. Enlarged calculation of production areas. 2. Calculation of areas of technological sites and workshops. 3. Calculation of the area of auxiliary premises 4. Solving problems with the calculation of warehouse and utility 	<p>Calculate production productivity, calculate raw materials and finished products. Select and calculate technological equipment in accordance with the product calculations. Calculate the production area.</p>

<p>3. Basic principles and methods of equipment placement in production shops.</p> <p>Lecture 6: Designing engineering support for production.</p> <ol style="list-style-type: none"> 1. Calculation of production needs for resources. 2. Automatic control of production processes, 3. Occupational health and safety 	<p>areas</p> <p style="text-align: center;">Practical lesson 8 The layout of production areas and workshops</p> <ol style="list-style-type: none"> 1. Layout of the main food production facilities 2. Layout of auxiliary production shops 	
<p style="text-align: center;">Topic 5. Designing an enterprise Lecture 7. Designing an enterprise</p> <ol style="list-style-type: none"> 1. Basic principles of master plans and their purpose 2. Construction solutions of the design object, characterization of structural schemes, and building construction. 3. Designing of engineering equipment systems for a food enterprise <p style="text-align: center;">Lecture 8. The computer-aided design system of a food enterprise.</p> <ol style="list-style-type: none"> 1. The concept of a CAD system 2. Banks and CAD databases 3. Economic calculations and evaluation of project efficiency. 	<p style="text-align: center;">Practical lesson 9 Master plans of enterprises</p> <ol style="list-style-type: none"> 1. Study of the requirements of the unified design documentation system. 2. Familiarization with examples of master plans for food production 3. Examples of the design of the graphic part of projects and explanatory notes <p style="text-align: center;">Practical lesson 10 The sanitary and technical part of the project</p> <ol style="list-style-type: none"> 1. Calculation of the heating system of an industrial enterprise. 2. Calculation of ventilation systems 3. Calculation of household premises at a food company 	<p>Develop a layout of the production building in accordance with the calculations made</p> <p>Prepare an individual assignment in the form of a calculation and explanatory note and a drawing on graph paper.</p>

Information sources

1. 1. Klymenko M.M., Pasichny V.M., Maslikov M.M. Technological design of meat and fat production / Edited by prof. Klymenka M.M./ Study guide. – Vinnytsia: Nova Kniga, 2005 – 384 p.
2. Drukovany M.F., Drukovany O.M. Basics of industrial construction and plumbing: Study guide. – Vinnytsia, 2010. – 290 p.
3. Pavlyuk R.Yu. Poharska V.V., Matsipura T.S. Basics of food technology / Study guide. Kharkiv: Fakt, 2016. Part 1. 152 p.
4. Technology of meat products from non-traditional meat raw materials: a textbook / L. V. Peshuk, M. O. Yancheva, O. I. Gaschuk, S. G. Kyrychenko; National University of Food technol., Hark.

- state University of Food and Bargaining – Kyiv: Center for Central and Eastern Europe, 2017. – 300 p.
5. Basic requirements for work documentation. DSTU B A.2.4-4-95 (GOST 21.101-93) [Effective from 01.07.1995] [Text]. - K.: State Committee for Urban Planning and Architecture, 1997. - 53 p. (Interstate Standard)
 6. DSTU 3008-95 Documentation. Reports in the field of science and technology. Structure and registration rules [Effective from 23.02.95] [Text]. - Kyiv.: State Standard of Ukraine, corresponds to ISO 5966:1982, 1995. - 38 p. (State Standard of Ukraine)
 7. DBN V.2.2–12-2003. (SNiP 2.10.02-84). Buildings and structures for storage and processing of agricultural products [Text]: seal. by order of the State Building of Ukraine 30.10.2003 No. 178: entered into force from 01.04.04. - K.: Derzhbud of Ukraine, 2004. - 12 p. /http://www.dbn.at.ua
 8. DBN V.2.5–39:2008. (SNiP 11-89-90). Engineering equipment of buildings and buildings External networks and structures. Thermal networks [Text]: sealed. by order of Min. Regin development and construction of Ukraine dated December 19, 2008 No. 568: entered into force on July 1, 2009. - K.: Ministry of Regional Construction of Ukraine, 2009. - 56 p. /http://www.pteplo.com.ua
 9. DBN V.1.1–7-2002. (SNiP 2.01.02-86, SNiP 11-2-80. Fire safety of construction objects [Text]: seal by order of the State Building of Ukraine dated December 3, 2001 No. 88: entered into force on May 1, 2003. - K.: Derzhbud of Ukraine, 2003. - 41 p.
 10. Educational and methodological manual for independent study of the discipline "Designing of meat production enterprises with the basics of CAD" according to the credit-module system of organizing the educational process. – Poltava: PUET, - 2009. – 52 p.
 11. Lozovsky A.P. Basics of technological design of industrial enterprises of processing industries / Lozovsky A.P., Ivanov O.M., Samoilenko T.V. – Sumy: University book, 2014.- 320 p.
 12. Grinberga-Zalite, G., & Zvirbule, A. (2022). Analysis of waste minimization challenges to European food production enterprises. *Emerging Science Journal*, 6(3), 530-543.
 13. Akhmetova, S. O., Suleimenova, M. S., & Rebezov, M. B. (2019). Mechanism of an improvement of business processes management system for food production: case of meat products enterprise. *Entrepreneurship and sustainability issues*, 7(2), 1015.
 14. Semenov, A., Kuksa, I., Hnatenko, I., Sazonova, T., Babiy, L., & Rubezhanska, V. (2021). Management of Energy and Resource-Saving Innovation Projects at Agri-Food Enterprises. *TEM Journal*, 10(2), 751.

Online resources

1. STATE BUILDING STANDARDS OF UKRAINE - Access mode: <https://dbn.co.ua/>
2. ESKD (Unified system of design documentation) - Access mode: https://dbn.co.ua/index/gost_eskd/0-105

Software of the discipline

- Microsoft Office software package, modern graphic editors for computer-aided design

The policy of studying the discipline and evaluation

- The policy on deadlines and retakes Assignments that are submitted late without valid reasons are assessed at a lower grade (75% of the possible maximum number of points for the activity). Rescheduling of modules takes place with the permission of the lead teacher if there are valid reasons.
- Policy on academic integrity: cheating during the implementation of current module work and testing is not allowed (including the use of mobile devices). Mobile devices are allowed to be used only during online testing, preparation of practical tasks during the class and work with Power Point and Microsoft Excel.
- Attendance policy: attendance is a mandatory component. For objective reasons, training can take place online (Moodle) in agreement with the lead teacher.

- The policy of crediting the results of non-formal education:
<http://puet.edu.ua/uk/publiczna-informaciya>

Evaluation

The final grade for the study of the discipline is calculated through the current assessment

Types of work	Maximum number of points
Semester 8	
Module 1-1. (topics 1-5) attendance at lectures and practical classes (32.0 points); academic work in practical classes (16.0 points); completion of individual tasks (26.0 points); completion of the current module control work (10.0 points)	100
Final control (credit)	100

Scale for assessing students' knowledge based on the results of the final control in the discipline "Design of biotechnological production"

The sum of points for all types of learning activities	Evaluation of the ECTS scale	Score on the national scale
90-100	A	excellent
82-89	B	well
74-81	C	
64-73	D	
60-63	E	satisfactorily
35-59	FX	unsatisfactory with the possibility of reassembly
0-34	F	unsatisfactory with mandatory re-study of the discipline