Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Faculty of Food Technology
Nutrition Technology Department

WORK PROGRAM OF EDUCATIONAL DISCIPLINE (SYLLABUS)

EC 4 Innovative engineering

It is implemented within the educational program
of ED "Master's degree"

specialties 181 "Food Technologies"
Faculty: Food Technologies

at the second (master's) level of higher education

Sumy - 2024

Developers: _____ **Maryna SAVCHENKO**

Ph.D., Associate Professor of the Nutrition Technology Department

Considered, approved and approved at the meeting of the nutrition technology department	protocol No.19 from 31.05.24		
	Head department	(signature)	**Oksana MELNYK** (surname, initials)

Agreed:

Guarantor of the educational program _____ Fedyr PERTSEVOY
(signature) (surname)

Dean of the Faculty,
where the educational program is implemented _____ Natalia BOLHOVA
(signature) (surname)

Review of the work program (attached) provided by: _____ Oksana MELNYK
(surname)

_____ Natalia BOLHOVA
(surname)

Methodist of the Education Quality Department,
licensing and accreditation _____ (_____)
(signature) (surname)

Registered in the electronic database: date: 24.06. 2024.

Information on viewing the work program (syllabus):

The academic year in which the changes are made	The number of the annex to the work program with a description of the changes	The changes were reviewed and approved		
		Date and number of the protocol of the meeting of the department	Head of Department	Guarantor of the educational program

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	The name is EC	EC 4. Innovative engineering			
2.	Faculty/department	Food technology/ Nutrition Technology			
3.	The status is EC	Mandatory			
4.	Program/Specialty (programs), which is a component of EC for (to be filled in for mandatory EC)	Educational program: Food technologies/specialty: 181 "Food technologies"			
5.	OK can be offered for (to be completed for selective EC s)				
6.	NRK level	7th level			
7.	Semester and duration of study	The first semester The duration of study is 15 weeks			
8.	Number of ECTS credits	5 credits			
9.	The total number of hours and their distribution (full-time study/part-time study)	Contact work (class)			Independent work
		Lectures	Practical/seminar	Laboratory	
		2		**16**	**132**
10.	Language of education	Ukrainian			
11.	Teacher/Coordinator of the educational component	The teacher is Ph.D., associate professor of the Nutrition Technology Department, Savchenko Maryna Yuriivna			
11.1	Contact Information	Auditorium of the department 314m, building #4, phone: 0993834398, E-mail: marina.saw4encko2011@gmail.com , consultation hours: every Monday from 1 to 2 p.m.			
12.	General description of the educational component	The theoretical and practical material consists of the appointment, selection, placement, operation, and maintenance of innovative technological equipment for the implementation of the technological process in the production of food products. The organization of laboratory work, types of laboratory equipment, and the main activities and directions of Innovative Engineering are given.			
13.	The purpose of the educational component	Training of highly qualified specialists who have mastered theoretical and practical knowledge and skills of professional activity and are able to independently deepen and expand them, using them in practice.			
14.	Prerequisites for studying EC, connection with other educational components of EP	The educational component is connected with other educational components "Automation of production processes", "Processes and devices of food production", "Technological equipment of food production"			
15.	Policy of academic integrity	If the fact of writing off is discovered during the exam, the student's work is canceled and the exam is retaken. Code of academic integrity (http://surl.li/khyd)			
16.	Link to the electronic resource	Moodle link: https://cdn.snau.edu.ua/moodle/course/view.php?id=2626			

2. LEARNING RESULTS UNDER THE EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

Study results for EC: After studying educationalcomponent, the student is expected to be able to..."	Softwarelearning outcomes, the achievement of which is aimed at the EC (indicate the number according to the numbering given in the EP)[1]				The result of learning the discipline is evaluated
	PLO 3	PLO 7	PLO 10	PLO 15	
DLO 1. To ensure optimization and innovative approaches to the scientific, technical and innovative activities of enterprises. Analyze innovative principles use of equipment. Systematizethe main stages of technology implementation in production.	x				Control work on theoretical material. Performance and protection of laboratory work. Exam
DLO 2. Carry out technical and economic analysis indicators of innovative projects. Be able to evaluate effectiveness of implementation technology in production. Develop modes of operation of the equipment in order to optimize them and optimize work		x			
DLO 3. Develop equipment and technological schemes for the production of food products of the enterprise and introduce innovative technological solutions in food production				x	
DLO 4. Analyze the current state of production, make innovative decisions to improve the quality of production, and formalize them scientific and technical documentation, scientific reports, securitydocuments, articles, etc.				x	

[1]It must correspond to the Matrix of ensuring the programmatic learning outcomes by the relevant components of the educational program, it is specified for the compulsory educational components of EP I and II level, for all (mandatory and selective EC)

3. CONTENTS OF THE EDUCATIONAL COMPONENT (CURRICULUM PROGRAM)

Topic. List of issues to be considered within the topic	Distribution within the general time budget			Recom-mended Books[1]
	Auditory work		Independent work	
	Lc	Lc		
Topic 1. The concept of innovative engineering. The main activities and directions of Innovative Engineering. The purpose of studying the discipline. Tasks of the discipline. General characteristics of innovative engineering. Classification of innovations. Engineering services. World and domestic trends. Innovations. Content and stages of innovation processes. Concepts and types of engineering. The main components of engineering. Types of innovative engineering functions. The main directions of rationalization of labor organization. The main stages of observation and data processing. Innovative engineering in the resource security of food enterprises	2	2	18	[1-5]
Topic 2. Innovation engineering. Information material. Definition of the main components of engineering. Structuring competitiveness by levels, taking into account the impact of innovations and the life cycle of innovations. Optimization of technological processes. Optimization of labor resources. Innovative principles of equipment use. The essence and types of innovations in the food industry. Classification of innovations. Signs of innovation. Properties of innovations. Diffusion of innovations. Innovation initiation factors. The main stages of technology implementation in production. Modern approaches to the selection of resources to ensure production. Evaluation of the effectiveness of technology implementation in production. The main directions of rationalization of labor organization. Methods of determining working time costs and their optimization. Evaluation of the effectiveness of the adopted labor optimization decisions.	2	2	18	[17,20,23,26, 27]

[1] A specific source from the main or additional recommended literature

Topic 3. The concept of an innovative project. Project concept and classification. Project management. Methods of selecting innovative projects for implementation. The essence and basic principles of measuring the effectiveness of innovations. Innovative approaches to technological design of food enterprises. Technical and economic substantiation of innovative projects and modeling of technological operations. Innovations in technological design. Innovative processes of new product design and analysis of project results. Concept of accelerated and combined design. Social, institutional and environmental analysis of an innovative project. Modern management of innovative projects.	2	2	20	[8,12,15,21, 22, 25,30]
Topic 4. Innovative activity of enterprises. Organizational forms of ensuring and implementing results. The concept of the State target program. Formation of an innovative model at the enterprise. The influence of innovative processes on the development of production. Venture business and new forms of integration of science and production. Basic concepts of scientific and technical developments. Features organizational forms of providing innovative activity. Scientific, technical and innovative activities of enterprises. Purpose of entrepreneurial activity. Subjects of innovative activity. Innovative activity of enterprises. Stages of formation of an innovative model at the enterprise. Institutionalization. The sphere of innovative activity.	2	2	20	[6-11, 13, 14,16,18,19, 21,24,31-33]
Topic 5. Food industry innovations. Innovative activity in the dairy industry: conditions and prospects for its development. Methodological support and practice of improving the efficiency of the dairy industry based on innovative activities. Innovative activity of the meat industry: conditions and prospects for its development. Environmental innovations in the meat industry. Innovations in fruit and vegetable production.	2	4	20	[34,35,37-42]

Topic 6. Organization of laboratory work. Safety equipment. Types of laboratory equipment. Basic rules of safety techniques when working in a biochemical laboratory. Reagents and their handling. Safety measures. Measuring devices. Sets of laboratory dishes. Analytical laboratory equipment, testing laboratory equipment.	2	2	18	[36,37]
Topic 7. World and domestic innovations. Innovative processes of drying, freezing and defrosting food products. Innovative technologies, equipment and automated equipment (robotics). Technology of caviar products with a capsule structure. Energy- and resource-saving waste-free technologies	2	2	18	[20, 28-30]
In total	**2**	**16**	**132**	

4. TEACHING AND LEARNING METHODS

DLO	Teaching methods (work,which will be conducted by the teacher during classroom classes, consultations)	Num -ber of hours	Teaching methods (which types of educational activities must be performed by the student independently)	Numb er of hours
DLO 1. Provide optimization and innovative approaches to scientific, technical and innovative activities of enterprises. Analyze innovative principles of equipment use. Systematize the main ones stages of technology introduction into production.	**Lectures:** - Informational (educational). - Orientation. Stimulating arouses interest to the topic. - Motivational. - Explaining Convincing - Problematic. **Presentations** (demonstration in formation on the subject). **Laboratory classes**. To analyze the ways of selecting the necessary information regarding innovations in technology using examples of calculations from scientific and technical literature **Consultations.** - Answers to questions, exchange of ideas, a small discussion with the teacher's conclusions.	4	Preparation to the lecture by reading the lecture material. Search for technical solutions in information sources. Study material for self-study. Completion of laboratory work tasks, the implementation of which was started during the laboratory classes.	34

DLO 2. To analyze technical and economic indicators of innovative projects. To be able to evaluate the effectiveness of technology implementation in production. Develop modes operation of equipment with the aim of their optimization and optimization of work	Lectures, as in the previous column. Presentations (demonstration in formation on the subject). Laboratory classes. To analyze the ways of selecting the necessary information regarding innovations in technology using examples of calculations from scientific and technical literature Consultations. Answers to questions, exchange of ideas, a small discussion with the teacher's conclusions.	4	Preparation to the lecture by reading the lecture material. Search for technical solutions in information sources. Study material for self-study. Completion of laboratory work tasks, the implementation of which was started during the laboratory classes.	32
DLO 3. Develop hardware and technological schemes for the production of food products enterprises and implement innovative technological solutionsin food production	Lectures, as in the previous column. Presentations (demonstration in formation on the subject). Laboratory classes. To analyze the ways of selecting the necessary information regarding innovations in technology using examples of calculations from scientific and technical literature Consultations. Answers to questions, exchange of ideas, a small discussion with the teacher's conclusions.	4	Preparation to the lecture by reading the lecture material. Search for technical solutions in information sources. Study material for self-study. Completion of laboratory work tasks, the implementation of which was started during the laboratory classes.	34
DLO 4. Analyze the current state of production, to make innovative decisions on improving improvement of production quality and issue them in the form of scientific and technical documentation, scientific reports, security documents, articles, etc.		2		32

5. EVALUATION BY THE EDUCATIONAL COMPONENT

5.1.Summative assessment

5.1.1. To assess the expected learning outcomes, it is provided

No	Summative methodsassessment	Points/ Percentage in the overall assessment	Compilation date
	Module I		
1.	writtencontrol work on theoretical material	*10 points / 10%*	In the sixth week
2.	Performance and protection of laboratory	*25 points / 25%*	Until the next laboratory session
	Module II		
3.	Written control work on the theoretical material	*10 points / 10%*	In the fourteenth week
4.	Performance and protection of laboratory work	*25 points / 25%*	Until the next laboratory session
5.	Exam- a written response to the ticket	*30 points / 30%*	

5.1.2. Evaluation criteria

Component[2]	**Unsatisfactorily**	**Satisfactorily**	**Fine**	**Perfectly**[3]
Written control work on the theoretical material	*<2-4 points*	*5-6*points	*7-8 points*	*9-10 points*
	Task requirements not met	*Answers to all questions are given, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question*	*All questions are answered*	*Answers to all questions are given, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed*
Performance and protection of laboratory work	*<12 points*	*13-17*points	*18-23 points*	*24-25 points*
	Task requirements not met	*Answers to all questions are given, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question*	*All questions are answered*	*Answers to all questions are given, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed*
	<17 points	*18-23 points*	*24-29 points*	*30 points*

[2]Specify the summative assessment component
[3]Specify the distribution of points and the criteria determining the level of assessment

Exam	*Task requirements not met*	*Most of the requirements are met, but individual components are missing or insufficiently disclosed, there is no analysis of other approaches to the issue*	*All requirements of the task have been fulfilled*	*All the requirements of the task have been fulfilled, the own solution and approach have been demonstrated*

5.8. Formative assessment:

To assess the current progress in learning and understand the directions for further improvement is provided

No	***Elements of formative assessment***	***Date***
1.	*Written survey after studying topics 1-3, 4-7*	*7 week, 14 week*
2.	*Verbal feedback from the teacher while working on the control work*	*11 week*

Self-assessment can be used as an element of summative assessment and formative assessment.

6. EDUCATIONAL RESOURCES (LITERATURE)

1. Yaroschuk A.O. Ukraine in the international exchange of engineering and technical services / A.O. Yaroschuk // Management of economic processes in the world and national economy: coll. theses of sciences works - K.: Analytical Center "New Economy", 2022. - 144 p.

2. Kuzmin O.E. Foreign experience in engineering / O.E. Kuzmin, V.Y., Zhezhukha, N.A. Horodyska // Problems of economy. – 2018. – No. 3. -WITH. 240 - 245.

3. V. Myasnikov. Engineering companies will stop fictitious modernization / V. Myasnikov// Independent newspaper. – 2021. – No. 7. - P.26 - 32.

4. Rumyantsev A.P. The world market of services: [study. manual] / A.P. Rumyantsev, Yu.O. Kovalenko. - K: Center for Educational Literature, 2019. - 456 p.

5. Kondratyuk A.A. Development of international engineering: global trends and domestic realities / A.A. Kondratyuk, I.M. Manaenko. // Collection of scientific works of young scientists of FMM NTUU "KPI named after Igor Sikorsky". – 2017. – No. 11.

6. Tugai O.A., Vlasenko T.V. General basics of engineering activity and its current state in Ukraine. // New technologies in construction. No. 34. - 2018.
http://ntinbuilding.ndibv.org.ua/archive/2018/34_2018/5.pdf

7. Yesilevsky S. Lip. 24, 2017. About science, innovation and the big difference between them. https://innovationhouse.org.ua/columns/o-nauke-ynnovatsyyah-y-bolshojraznytsemezhdu-nymy-2/

8. Technological innovations and practices in engineering education: a review. Marcela Hernandez-de-Menendez & Ruben Morales-Menendez . International Journal on Interactive Design and Manufacturing (IJIDeM) volume 13, pages 713–728 (2019).

9. Ikhlaq Sidhu. Innovation Engineering: Principles and Methodology. May 22, 2019.https://scet.berkeley.edu/innovation-engineering-principles-and methodology/

10. Alkema V. G., Litvin N. M., Kyrychenko O. S. Economic security of an innovative enterprise: training. manual. K.: KROC University of Economics and Law, 2019. - 320 p.

11. Butko M., Popelo O. Venture financing as a mechanism for realizing the innovative potential of the entrepreneurial environment of the region. Economist. 2022. No. 3. – P. 20–22.

12. Bondar K. Assessment of the risks of implementing an innovative project. URL: http://www.rusnauka.com/20_PRNiT_2007/Economics/23668.doc.htm

13. Verbytska G. L. Peculiarities of marketing support for innovations of domestic industrial enterprises in the conditions of international economic relations. Bulletin of the Lviv Polytechnic National University. Logistics. 2021. No. 846. – P. 36–41. URL: http://nbuv.gov.ua/UJRN/VNULPL_2016_846_9.

14. Kaverina N.O. Scientific and methodological approaches to the analysis and assessment of risks of innovative activity. Scientific Journal "ScienceRise". 2022. No. 5/3 (5). -WITH. 74–79.

15. Kavetsky V. V., Prychepa I. V., Nikiforova L. O. Economic justification of innovative solutions: training. manual. Vinnytsia: VNTU, 2021. – 136 p.

16. Kirylenko I. V. The role of venture financing in the development of innovative activity. Bulletin of Taras Shevchenko Kyiv National University. 2020. No. 24–25. -WITH. 87–91.

17. Kopytko M. I. The influence of the latest technologies on the level of national security of Ukraine. Transformation of international security: modern challenges and threats: materials of the international scientific conference (Lviv, March 22–23, 2018) / editors: M. Malskyi, R. Vovk, O. Kuchyk, P. Bayor. Lviv: Faculty of International Relations of Ivan Franko National University, 2021. – pp. 22–25.

18. Mykytyuk P. P., Krysko Zh. L., Ovsyanyuk-Berdadina O. F., Skochilyas S. M. Innovative development of the enterprise. education manual. Ternopil. PP "Printer Inform", 2020. - 224 p.

19. Management of innovative activity: master's course: textbook / B. M. Andrushkiv, O. B. Boyko, Y. Ya. Vovk, I. P. Vovk, O. M. Vladimir, P. D. Dudkin, I. A. Kinash, L. Ya. Malyuta, N. Yu. Marynenko, L. M. Melnyk, G. S. Nagornyak, V. A. Palyanitsa, O. B. Pogaidak, O. V. Skidan , I.I. Stoyko, I.B. Fedyshyn, R.P. Sherstyuk. Ternopil: FOP Palyanytsia V.A., 2019. –1146 p.

20. Management of innovations: education. manual / O. I. Gutorov, L. I. Mykhaylova, I. O. Sharko, S. G. Turchina, O. V. Kyrychok. Kind. 2nd, add. Kharkiv: "Disa plus", 2020. - 266.

21. Project management: training. manual / editor: L. Ye. Dovgan, G. A. Mohonko, I. P. Malik. K.: KPI named after Igor Sikorskyi, 2017. – 420 p.

22. Vlasova A.M., Krasnokupskyi N.V. Innovative management: Education. manual. - K.: KNEU, 2022 - 92 p.

23. Establishment of a regional innovation market in Ukraine / Ed. I.M. Budnikevich. Chernivtsi: 2022. – 200 p.

24. Economy and organization of innovative activity. Education village for university students education institutions / A.I. Sukhorukov - K.: Institute of Muniz. of management and business, 2021. – 184 p.

25. Innovative management: Problems of formation in the conditions of a transitional economy. / Under the editorship M.F. Head - K.: 2022. - 400 p.

26. Innovative management. Education village / Under the editorship Vasylenko O.M. K.: TsUL, 2023.– 400 p.

27. Innovative management: Education. manual / Krasnokutska N.V. - K., 2023. - 504 p.

28. Innovative development of industrial enterprises: Concept, methodology, strategic management: Monograph / Hrynyov A.V. - Kh., 2023. - 308 p.

29. Innovative forms of regional development: Education. manual for universities / Stechenko D.M. - K.: Higher School, 2022. - 254 p.

30. Innovations: theory, mechanism of development and commercialization: Monograph / Savchuk V.S. - K, 2023. - 396 p.

31. Approval of the innovative model of the development of the economy of Ukraine / Ed. A.S. Galchynsky. - K.: 2023. - 433 p.

32. Management of innovative development: problems, concepts, methods. Education manual for universities. Recommended by the Ministry of Education and Science of Ukraine / Ed. S.M. Ilyashenko Sumy: University book, 2023. – 288 p.

33. Tsygylyk I.I. Economics and organization of innovative activity: Study guide. – Ivano-Frankivsk: Institute of Management and Economics, 2021. – 148 p.

34. F.V. Pertseviy Industrial technologies of meat, milk and fish processing / F.V. Pertseviy. - K.: Inkos, 2018. - 346 p.

35. Reference summary of the lectures of the discipline "Innovative engineering in the restaurant industry" for students of the specialty 8.05170112 "Food technology" of the educational qualification level master's full-time study [Electronic resource] / compiled by A.B. Horalchuk, O.Yu. Nagornyi, O.V. Kotlyar. -Electron. data. - Kh.: KhDUHT, 2019. - 1 electron. wholesale disc (CD-ROM); 12 cm. – Title from tit. screen

36. Techniques of laboratory work. Aleksandrova K.V., Bilokon L.E., Makoid O.B. Under the general editorship of the head Department of Biochemistry and Laboratory Diagnostics, Doctor of Chemistry, Prof. Alexandrova K.V. Zaporizhzhia, 2019. - P. 164

37. V.F. Dotsenko Equipment of restaurant establishments / V.F. Dotsenko, V.O. Gubenya, - Kyiv: Kondor – Publishing House, 2019. -636 p.

38. H.O. heresy Technological equipment of dairy production / Yeresko G.O., Shynkaryk M.M., Voroshchuk V.Ya.; Kyiv, "INOX" company, 2020. - 338 p.

39.O. V. Gvozdev, F. Yu. Yalpachik, Yu. L. Rogach, D. M. Kyurcheva. "Technological equipment for processing livestock products", Sumy, "ENVIRONMENT" 2020, -420 p.

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