

Ministry of education and science of Ukraine
Sumy national agrarian university
Cybernetics and Informatics Department
Faculty of Economics and Management

Module syllabus

Modern information technologies in scientific activity


Specialty	181 Food Technology
Educational professional program	Food Technology
Higher education level	3(Doctor of Philosophy)

Sumy 2023

Розробник:



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Розглянуто, схвалено та затверджено на засіданні кафедри кібернетики та інформатики	протокол від 02.07.2023 р. №16		
	Завідувач кафедри	 Світлана АГАДЖАНОВА (підпис) (прізвище, ініціали)	

Погоджено:

Завідувач відділу аспірантури та докторантури



Світлана ЯРОЩУК

Рецензія на робочу програму (додається) надана: С.АГАДЖАНОВА



Методист відділу якості освіти,

ліцензування та акредитації



(Надіє Т. Баранів)

Зареєстровано в електронній базі: дата: 07.07.2023р.

Ак

Syllabus review data:

The academic year in which changes are made	The Academic program attachment number with changes description	Changes revised and approved		
		Minutes No and date of the department meeting	Head of Department	Guarantor of the Academic program

1. MODULE OVERVIEW

1.	Title	Modern information technologies in scientific activity			
2.	Faculty/Department	Economics and Management/Cybernetics and Informatics			
3.	Type (compulsory or optional)	mandatory			
4.	Program(s) to which module is attached (to be filled in for compulsory types)	Food Technology/ 181 Food Technology			
5.	Module can be suggested for (to be filled in for optional types)				
6.	Level of the National Qualifications Framework	8-th			
7.	Semester and duration of module	3 semester, 1-10 weeks			
8.	ECTS credits number	3-rd			
9.	Total workload and time allotment	Directed study			Self-directed study
		Lectures	Practicals	Labs	
		20	-	20	50
10.	Language of instruction	english			
11.	Module leader	Oleksandr Viunenko, Associated Pofessor, Ph.D			
12.	Module leader contact information	oleksandr.viunenko@snau.edu.ua; room 308e.			
13.	Module description	Studying the discipline allows applicants to obtain the necessary knowledge and skills in the application of modern information technologies in scientific activities, in particular, for working on text and graphic information on the Internet; searching for scientific information in information databases and data banks; presenting the results of their own scientific activities; high-quality visual design of numerical and schematic research results			
14.	Module aim	The aim of teaching the academic discipline “Modern Information Technologies in Scientific Activity” is to provide higher education students with a thorough understanding of the possibilities, effectiveness, and prospects of using information technologies in scientific research, as well as to help them acquire skills and practical experience in the application of IT tools, services, and information and communication technologies in scientific activity.			
15.	Module Dependencies (prerequisites, co-requisites, incompatible modules)	The educational component is the basis for the Method and technology of scientific information processing			
16.	The policy of academic integrity	<p>The academic integrity policy at Sumy National Agrarian University is defined by the documents presented on the page: https://snau.edu.ua/viddil-zabezpechennya-yakosti-osviti/zabezpechennya-yakosti-osviti/akademichna-dobrochesnist/ Academic integrity of PhD candidates is an important condition for mastering the results of learning in the educational component and receiving the appropriate grades from current and final tests.</p>			

		<p>In case of violation of academic integrity by a PhD candidate (cheating, plagiarism, fabrication), the work is assessed as unsatisfactory and must be redone. In this case, the teacher reserves the right to change the topic of the assignment.</p> <p>For violations of academic integrity, candidates for a Doctor of Philosophy degree may be subject to the following academic penalties:</p> <ul style="list-style-type: none"> – retaking the assessment (test, exam, credit, etc.); – retaking the relevant educational component of the educational program. <p>The exam may be retaken with the permission of the vice-rector for scientific, pedagogical, and educational work if there are valid reasons (e.g., sick leave).</p>
17	Link in Moodle	https://cdn.snau.edu.ua/moodle/course/view.php?id=4566

2. CORRELATION BETWEEN MODULE LEARNING OUTCOMES (MLOs) AND PROGRAM LEARNING OUTCOMES (PLOs)

Learning outcomes for EC: After studying the educational component, the higher education applicant is expected to be able to	Program learning outcomes that the OC aims to achieve (indicate the number according to the numbering given in the OP)			How learning outcomes are assessed
	PLO3	PLO8	PLO12	
MLOs1. Apply knowledge in practical situations and use modern information technologies to study technical and social processes.			x	Multiple choice tests, calculation tasks
MLOs 2. Conduct research at the PhD level using information and communication technologies	x			Individual task
MLOs 3. Collect, process, and analyze information published on Internet resources; present the results of professional activities using modern information technologies and software products.	x			Quick polls, discussions, and problem solving
MLOs 4. Select and effectively use modern software for conducting scientific research		x		Multiple choice tests, calculation tasks

3. MODULE INDICATIVE CONTENT

Autumn semester

Topics	Distribution of hours				Learning resources
	Directed study			Self-directed study	
	Lectures	Practicals	Labs		
Topic 1. Introduction. Information technologies: information and logical content and structural organisation. 1.1 Principles of construction and criteria for evaluating modern information technologies 1.2 Information and structural support for information technologies 1.3 Telecommunications support for IT Databases. Expert systems and databases 1.4 Information systems.	2	2		5	Basic: 1, 3 Methodological: 1 Additional: 1-4
Topic 2. Designing information technologies using the DEFO methodology. 2.1 IDEF0 standard. Basic elements and concepts 2.2 Developing an IDEF0 model 2.3 Types of relationships between tasks. IDEF0 diagrams: rules and recommendations for construction	2	2		5	Basic: 1, 3 Methodological: 1 Additional: 1-4
Topic 3. Data Mining Tasks. Classification and Clustering. 3.1. Classification Tasks and Types. 3.2. Methods Used to Solve Classification Tasks. 3.3. Clustering Task. 3.4 Application of Cluster Analysis in Food Technology field.	2	2		5	Basic: 1, 3 Methodological: 1 Additional: 1-4
Topic 4. Data Mining Tasks. Forecasting and Visualisation. 4.1. Forecasting Tasks. 4.2. Forecasting and Time Series. 4.3. Trend, Seasonality, and Cycle. 4.4. Types of Errors and Forecasts. 4.5 Visualisation of Data Mining Tools in Food Technology field.	2	2		5	Basic: 1 Additional: 1-2
4.6. Visualisation methods. 4.7. Principles of visual media composition. 4.8. Key trends in visualisation. 4.9. OLAP technologies	2	2		5	Basic: 1-5 Additional: 1-5
Topic 5. Methods of fractal analysis. 5.1. The concept of a "fractal". 5.2. Information space and fractals. 5.3. DFA method. 5.4. Fano factor. 5.5. Hurst index.	2	2		5	Basic: 1-3 Additional: 2

5.6. Cantor set. 5.7. Multifractals. 5.8. Calculation of the multifractal spectrum.					
Topic 6. Business analysis of market conditions in Food Technology field. 6.1. Business analysis of the organisation's external environment. 6.2. Components of market analysis. 6.3Market evaluation criteria.	2	2		5	Basic: 1-3 Additional: 1-3
Topic 7. Neural networks. Self-organising Kohonen maps. Methods for finding associative rules. 7.1. Classification of neural networks. 7.2. Choosing a neural network structure. 7.3. Kohonen maps. 7.4. Neuron input and output map. 7.5. What are associative rules? 7.6. Algorithms for searching for associative rules. 7.7Methods for searching for associative rules in Food Technology field.	2	2		5	Basic: 1-3 Additional: 1-4
Topic 8. The concept of internet marketing and internet business. 8.1. The history of the development of internet marketing and internet business. 8.2. Internet marketing: goals and objectives. 8.3. Internet marketing: advantages. Internet marketing tools.	2	2		5	Basic: 1-3 Additional: 1-4
Topic 9. Fundamentals of information security. Electronic authentication of documents and their protection. 9.1. Problems of information protection in modern information systems. Main types of computer crimes. 9.2. Computer viruses as a threat to information systems. 9.3. Data protection in word processors and spreadsheets. 9.3. Data protection in word processors and spreadsheets. 9.4. Electronic signature. Authentication of documents using an electronic signature. 9.5. Use and obtaining of an electronic signature. 9.6. Biometric information protection. 9.1. General recommendations for protecting information when working with computer devices and information systems	2	2		5	Basic: 1-3 Methodological: 1 Additional: 1

Topic 10. Cloud technologies. 10.1. Introduction to cloud technologies 10.2. Cloud service model tools as a replacement for office applications 10.3. Analysis of service models/service representations (Service Models) from a security perspective 10.4. Analysis of cloud deployment models (Deployment Models) from a data security perspective in Food Technology field.					Basic: 1-3 Methodological: 1 Additional: 1
Total hours	20	20		50	

4. TEACHING AND LEARNING METHODS

MLOs	Teaching methods (directed study)	Hours	Learning methods (self-directed study)	Hours
MLOs1. Apply knowledge in practical situations and use modern information technologies to study technical and social processes.	Lecture, practical lesson, discussion of topical issues	10	Elaboration of theoretical material, solution of calculation tasks	10
MLOs 2. Conduct research at the PhD level using information and communication technologies	Lecture, practical lesson, discussion of topical issues	10	Elaboration of theoretical material, solution of calculation tasks	10
MLOs 3. Collect, process, and analyze information published on Internet resources; present the results of professional activities using modern information technologies and software products.	Lecture, practical lesson, discussion of topical issues	10	Elaboration of theoretical material, solution of calculation tasks	14
MLOs 4. Select and effectively use modern software for conducting scientific research	Lecture, practical lesson, discussion of topical issues	10	Elaboration of theoretical material, solution of calculation tasks	16
Total hours		40		50

5. ASSESSMENT

5.1. Diagnostic assessment

5.2. Summative assessment

5.2.1. Intended learning outcomes methods:

No	Summative assessment methods	Grades	Deadline
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Autumn semester			
1.	Practical Work 1-5	20 points / 20 %	5 week
2.	Practical Work 6-12	35points / 35 %	10 week
3.	Test	15 points / 15 %	During semester
4.	Exam	30 points / 30 %	10 week

5.2.2. Grading criteria

Summative assessment method	Unsatisfactory	Satisfactory	Good	Excellent
Practical Works 1-5.	<i>0-3 points</i>	<i>4-10 points</i>	<i>11-15 points</i>	<i>16-20 points</i>
	Task not completed (method and answers are incorrect)	The progress is correct, but there are significant errors, the answers are mostly wrong	The task is completed, but there are minor errors	Task completely done. Mistakes missing
Practical Works 6-12	<i>0-3 points</i>	<i>4-10 points</i>	<i>11-20 points</i>	<i>21-35 points</i>
	Task not completed (method and answers are incorrect)	The progress is correct, but there are significant errors, the answers are mostly wrong	The task is completed, but there are minor errors	Task completely done. Mistakes missing
Multiple choice test	<i>0-3 points</i>	<i>4-7 points</i>	<i>8-10 points</i>	<i>11-15 points</i>
	Depends on the number of correct answers to the test	Depends on the number of correct answers to the test	Depends on the number of correct answers to the test	Depends on the number of correct answers to the test
Exam	<i>0-10 points</i>	<i>11-17 points</i>	<i>18-24 points</i>	<i>25-30 points</i>
	Task not completed (method and answers are incorrect)	The progress is correct, but there are significant errors, the answers are mostly wrong	The task is completed, but there are minor errors	Task completely done. Mistakes Missing

5.3. Formative assessment

Formative exercises are designed to enable students to develop particular aspects of their learning, prior to summative assessments. Formative exercises are designed to help students use feedback and self-reflection to manage and develop their learning so that they can see how to improve their work.

No	Formative Assessment elements	Date
1.	Oral interview after studying each topic	After completing the study of the topic
2.	Passing the test on certification and modular control with feedback from the teacher	According to the schedule of the educational process

3.	Passing the test after the end of the study of each topic for independent control of knowledge and preparation for the test (exam)	Regulated by the student independently
4.	Protection of practical works	One week after their delivery
5.	Oral feedback from the teacher while working on practical work during classes	Throughout the semester

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

6. LEARNING RESOURCES

6.1. Key resources

1. Ivanova, L., Kaverinskiy, V., Kotlyk, S., et al. (2023). Modern information technologies in scientific research and educational activities. Iowa State University Digital Press.
2. Punziano, G., & Delli Paoli, A. (Eds.). (2021). Handbook of Research on Advanced Research Methodologies for a Digital Society. IGI Global.
3. Schuster, K., & Dunn, S. (Eds.). (2021). Routledge International Handbook of Research Methods in Digital Humanities. Routledge.

6.2 Methodical resources

1. S.Ahadzhanova Modern information technologies in scientific activity (e-course in Moodle:Address – <https://cdn.snau.edu.ua/moodle/course/view.php?id=4566>

6.2.2 Additional resources

1. Mental Rotation Ability and Preferences in Vocational Education. / Svitlana Ahadzhanova, Oleksandr Burov, Evgeniy Lavrov, Karen Ahadzhanov- Honsales, Olena Hlazunova, Oleksandr Viunenko// Advances in Intelligent Systems and Computing. Volume 1322. Springer Nature Switzerland AG 2021 D. Russo et al. (Eds.): IHSI 2021, AISC 1322, pp. 267–272, 2021. https://doi.org/10.1007/978-3-030-68017-6_40
2. VR in education: Ergonomic features and cybersickness.[Електронний ресурс] / Svitlana Ahadzhanova, Victoriya Logvinenko, Yana Dolgikh, Tetyana Kharchenko, Olena Hlazunova, Andrii Shabalin,Olha Pinchuk, Oleksandr Burov// Advances in Intelligent Systems and Computing. Springer Nature Switzerland AG 2020S. Nazir et al. (Eds.): AHFE 2020, AISC 1211, pp. 350–355, 2020. https://doi.org/10.1007/978-3-030-50896-8_50
3. Ahadzhanova, Yu. Rudenko,K. Ahadzhanov-Honsales, A.Batalova. Effectively learning ukrainian practices of forming young media literacy. , MIPRO 2023 - Proceedings, Opatija, Croatia, 2023. - P.710-716 ISSN 1847-3946 IEEE Region 8 https://docs.mipro-proceedings.com/proceedings/mipro_2023_proceedings.pdf

4. Rudenko Y., Drushlyak M., Osmuk N., Shvets O., Kolyshkin O., Semenikhina O. Problems of Teaching Pupils of Non-Specialized Classes to Program and Ways to Overcome Them: Local Study. International Journal of Computer Science and Network Security. 2022. Vol. 22, No. 1. P. 105-112 <https://doi:10.22937/IJCSNS.2022.22.1.16>

6.2. Soft ware

1. MATLAB,
2. Mathematica,
3. Power BI,
4. MS Excel,
5. WolframCloud