

Ministry of education and science of Ukraine
Sumy national agrarian university
Faculty of economics and management
Department of management named by L.Mykhailova

Syllabus of the educational component

DATA ANALYTICS AND DIGITALIZATION IN MANAGEMENT

(mandatory)

Specialty	D3 Management
Educational program	Management
HE level	doctor of philosophy the third (educational and scientific) level of higher education

Creator: [Signature] Inna Sokhan, Dr.Sci in Management, professor of Management
department named by L.Mykhailova

Considered, reviewed and approved on the meeting
of the department of Management
named by L.Mykhailova, prot.# 15 from "10" 06 2025

The head
of the department

[Signature] Alvina OREKHOVA
(sign) (name)

Approved:

Guarantor of the educational program

[Signature] Inna SOKHAN
(sign) (name)

Dean of the Faculty

[Signature] Svitlana LUKASH
(sign) (name)

Head of PhD Department

[Signature] Svitlana Yaroshchuk
(sign) (name)

A review of the work program has been provide

[Signature] A. Orekhova
(sign) (name)

(sign) (name)

Methodist of the Department of Education Quality,
licensing and accreditation

[Signature] N. Borachen
(sign) (name)

Registered in the electronic database: date: 03.07. 2025

SNAU, 2025

Information on viewing the work program (syllabus):

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 EP

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	Name of EC	Data analytics and digitalization in management			
2.	Faculty/Department	Faculty of Economic and Management / Department of Management named by L.Mykhailova			
3.	State of EC	Obligatory			
4.	Program/Specialty (programs) of which the OC is a component (to be filled in for mandatory OCs)				
5.	Program/Specialty	Scientific and educational program «Management». The third (educational and scientific) level of higher education. Level of higher education: doctor of philosophy. Field of study: D - «Management and administration». Specialty: D3 - «Management».			
6.	Level of NFC	8			
7.	Semester and studying duration	Full-time 14 weeks, 2 semestr			
8.	ECTS credits number	3			
9.	Total workload and time allotment Language of instruction	Directed study			Self-directed study
		Lectures	Seminars	Labs	
		20	20	-	50
10.	Lecturer/Leader of educational component	English			
11.	ECTS credits number	Inna Sokhan, Dr.Sci in Management, professor of Management department named by L.Mykhailova			
11.	Contacts	Consultations hours – every tuesday at 12.15, online; inna.sokhan@snau.edu.ua			
12.	Educational component description	The educational component "Data Analytics and Digitalization in Management" is an important component of the training of future PhDs. In today's rapidly developing world, the ability to work effectively with data is becoming a decisive competitive advantage for any manager. This OC is extremely relevant, as it provides the necessary knowledge and skills to navigate through huge amounts of information, make informed decisions, and identify new business opportunities. Studying this discipline allows specialists not only to understand how digital technologies are transforming management, but also to actively use them to increase efficiency, optimize processes, and create innovations. This helps to prepare highly qualified managers who are able to manage companies in the digital economy and successfully face the challenges of the future.			
13.	Educational component aim	Formation of competencies among students of the third (educational and scientific) level that will allow them to create, analyze and solve complex problems in a changing environment, and to provide a comprehensive approach to making management decisions			

14.	Prerequisites for educational component studying, connection with other educational components of EP	1. The educational component is based on the study of EC: EC2, EC3, EC8 2. The educational component is the basis for studying EC: organization of preparation of scientific publications and writing of dissertations
15.	Policy of academic integrity	According to the Code of Academic Integrity of the Sumy NAU, academic integrity is a set of principles, rules of behavior of participants in the educational process, aimed at forming an independent and responsible personality, capable of solving tasks in accordance with the educational level in compliance with the norms of law and social morality. Observance of academic integrity by students of higher education involves independent performance of educational tasks, tasks of current and final control, learning results. It is expected that students of higher education will adhere to the principles of academic integrity, being aware of the consequences of its violation, which is determined by the regulatory documents of the Sumy National Agrarian University, in particular the Code of Academic Integrity, the Regulations on the Prevention and Detection of Academic Plagiarism at the Sumy NAU (a full list of regulatory documents is posted on the university's website. https://snau.edu.ua/viddil-zabezpechennya-yakosti-osviti/zabezpechennya-yakosti-osviti/akademichna-dobrochesnist/). For violation of academic integrity, students of higher education may be held to the following academic responsibility: - repeated assessment (test, exam, credit, etc.); - repeated completion of the training course; - warning; - issuing a reprimand; - expulsion from the university; (Part 5 of Article 48 of the draft Law of Ukraine "On Education"); - arrest or restriction of liberty, or deprivation of liberty, with deprivation of the right to hold certain positions or engage in certain activities with a fine.
16.	Moodle link	
17.	Keywords:	Digitalization, data analysis, management, decision-making, global environment

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

Learning outcomes for EC (MLOs): On successful completion the educational component, the student will be able...	Program learning outcomes, PLOs (specify the number according to the numbering given in EP) ¹			How is assessed
	PLO ₂	PLO ₆	PLO ₇	
MLOs 1. Be able to select, structure, and clean data from various sources; apply statistical methods for data analysis.		x		Research tasks
MLOs 2. Use analytical tools to support management decisions.	x			Individual task
MLOs 3. Identify problems and opportunities for applying data analysis in real business situations.			x	Multiple choice test

PLO₀₂ Apply modern tools and technologies for searching, processing and analyzing information, in particular, statistical methods for analyzing large-scale and/or complex data, specialized databases and information systems.

PLO₀₆. Develop and implement scientific and applied projects that provide an opportunity to rethink existing and create new holistic knowledge and/or professional practice in the field of management and administration and solve significant scientific and technological problems in management in compliance with the norms of academic ethics and taking into account social, ethical, economic, environmental and legal aspects.

PLO₀₇. Develop theories, concepts and principles of management for the implementation of the principles of sustainable development at different levels of management, integrate the obtained research results into logical structures for solving theoretical and practical management problems in accordance with the topic of their own research.

3. CONTENT OF THE EDUCATIONAL COMPONENT (CURRICULUM PROGRAM)

Topic. List of issues to be considered within the topic	Distribution within the general time budget		Learning resources
	Class work	Individual work	

Topic 1. Introduction to digitalization and data management in modern management. Plan: 1. Digital transformation: essence and impact on business. 2. The role of data and information in making management decisions. 3. The concept of data-driven management. 4. Stages of the data life cycle.	2	2	5	1-13
Topic 2. Big Data: basics and applications. Plan: 1. Definition, characteristics (3V/5V) and architecture of Big Data. 2. Sources of Big Data in management. 3. Big Data technologies (Hadoop, Spark, NoSQL). 4. Case studies of Big Data applications in various industries.	2	2	5	1-13
Topic 3. Basics of data collection and storage. Plan: 1. Data collection methods (internal, external sources, API). 2. Types of databases (relational, non-relational). 3. Cloud technologies for data storage and processing (AWS, Azure, Google Cloud).	2	2	5	1-13
Topic 4. Data cleaning and preparation for analysis. Plan: 1. Data quality problems (missing values, duplicates, errors). 2. Data cleaning methods. 3. Data normalization and standardization. 4. Data transformation for further analysis.	2	2	5	1-13
Topic 5. Descriptive analytics: basics and tools. Plan: 1. Data summary methods (mean, median, mode, standard deviation). 2. Frequency distributions and histograms. 3. Using Excel for descriptive statistics. 4. The concept of dashboards.	2	2	5	1-13
Topic 6. Predictive and prescriptive analytics: forecasting future trends and optimizing decision-making Plan: 1. Forecasting methods (time series, moving average, exponential smoothing).	2	2	5	1-13

2. Fundamentals of machine learning for forecasting (linear regression, decision trees). 3. Modeling and simulation of business processes. 4. Use of prescriptive analytics in logistics, pricing.				
Topic 7. Data visualization in management. Plan: 1. Principles of effective data visualization. 2. Types of graphs and their application. 3. Data visualization tools (Power BI, Tableau). 4. Development of interactive dashboards for management control.	2	2	5	1-13
Topic 8. Data analysis in personnel management (HR analytics). Plan: 1. Analysis of staff turnover. 2. Forecasting employee performance. 3. Optimization of hiring processes. 4. Analysis of staff satisfaction.	2	2	5	1-13
Topic 9. The future of digitalization and data analysis in management. Plan: 1. New trends and technologies (IoT, blockchain, quantum computing). 2. Development of artificial intelligence and its impact on management professions. 3. Career prospects in data science and analytics.	2	2	5	1-13
Total	20	20	50	

4.TEACHING AND LEARNING METHODS

MLO	Teaching methods (work to be carried out by the teacher <u>during classroom classes</u> , consultations)	Teaching methods (what types of educational activities should the student <u>perform independently</u>)
MLOs 1. Be able to select, structure, and clean data from various sources; apply statistical methods for data analysis.	Verbal methods: lecture, explanation, educational discussion	Method of ready knowledge
	Visual methods: demonstration	Method of formation of abilities and skills
	Practical methods: practical works, individual	Research method

	calculation and analytical tasks	
	Method of tutoring	Methods of checking and evaluating knowledge, abilities and skills
MLOs 2. Use analytical tools to support management decisions.	Verbal methods: lecture, explanation, educational discussion	Method of ready knowledge
	Visual methods: demonstration	Method of formation of abilities and skills
	Practical methods: practical works, individual calculation and analytical tasks	Research method
	Method of tutoring	Methods of checking and evaluating knowledge, abilities and skills
MLOs 3. Identify problems and opportunities for applying data analysis in real business situations.	Verbal methods: lecture, explanation, educational discussion	Method of ready knowledge
	Visual methods: demonstration	Method of formation of abilities and skills
	Practical methods: practical works, individual calculation and analytical tasks	Research method
	Method of tutoring	Methods of checking and evaluating knowledge, abilities and skills

The following teaching methods will be used during lectures and practical classes:

Explanation. Interpretation of concepts, phenomena, principles, terms, etc., mainly during the teaching of new material.

Educational discussion. This is a discussion of an important issue, an exchange of ideas between students of higher education and/or a teacher, aimed not only at the assimilation of new knowledge, but also at the creation of an emotionally saturated atmosphere that would contribute to a deep penetration into the truth.

Illustration. Using presentations and other media content to reinforce material being explained, discussed or tasks being performed.

Demonstration. Presentation by the teacher of educational materials in dynamics (use of professional programs, situations, etc.).

Written and oral test tasks. Independent concentration and reproduction of acquired knowledge and skills in conditions of limited time and sources of information.

Cases. Algorithmic search for a solution through the use of typical methods, which, unlike the solution of cases, does not require identification of the problem and original approaches to its solution.

Demonstration and discussion of presentations. Visual display of the media accompaniment of the oral presentation with elements of the discussion.

Comparison. With its help, common and distinctive features of objects and phenomena are established.

Exercises. In their essence, they are multiple repetitions of certain actions or types of activity with the aim of their assimilation, which is based on understanding and is accompanied by conscious control and correction. The following types of exercises are used in the educational process: preparatory (they prepare students of higher education to perceive new knowledge and ways of applying it in practice); introductory (contribute to the assimilation of new material based on the distinction of related concepts and actions); trial (first tasks to apply newly acquired knowledge); training (contribute to the formation of skills in standard conditions: according to a sample, instruction, task); creative (the content and method of execution are close to real life situations); control (mainly educational: written, graphic, practical exercises).

Analysis method. Its essence consists in the study of objects or phenomena according to individual signs and relations, in the division into elements, and the understanding of the connections between them.

5. EVALUATION BY THE EDUCATIONAL COMPONENT

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

№	Methods of summative assessment	Points / Weight in the overall assessment	The date of compilation
1.	Research task	40/40%	6,13 week
2.	Individual task	30/30%	14 week
3.	Test	30/30%	14 week

5.1.2 Evaluation criteria

Component	Unsatisfactory	Satisfactory	Good	Excellent
Cases	< 15 points	15-24 points	25-35 points	36-40 points
	The task requirements have not been fulfilled	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 were met, creativity and thoughtfulness were demonstrated, and an own solution to the problem was proposed
Individual task	<18 points	18-21 points	22-26 points	27-30 points
	the correct answer was provided for less than 60% of the tasks	the correct answer was provided for 60%-74% of the tasks	the correct answer was provided for 75%-89% of the tasks	90% or more tasks were answered correctly
Test	<18 points	18-21 points	22-26 points	27-30 points
	The task requirements have not been fulfilled	Most of the requirements are met, but some components are missing or	All requirements of the task have been fulfilled	All the requirements of the task were met, creativity and thoughtfulness were demonstrated, and an own solution to the problem was

		insufficiently disclosed		proposed
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5.2. Formative assessment:

5.2.1 To evaluate the current progress in education and understand the areas of further improvement, is provided

№	Elements of formative assessment	Date
1	Testing after learning the topics № 2,4,5,7-10.	3 week, 7 week
2	Verbal feedback from the teacher during classroom work	constantly
3	Oral survey during classes and feedback from the teacher during classroom work	constantly
4	Conversation and discussion during classroom lectures	constantly
5	Written feedback from the teacher based on the results of the INHW	6,13 week
6	Discussion of situational tasks and presentations on the subject of independent study of the discipline	constantly
7	Verbal feedback from the teacher and students after the exam	14 week

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

5.3 Total number of points for EC and rating scale

The total number of points for the educational component is 100 points.

5.3.1 Evaluation scale operating at the University:

The sum of points for all types of educational activities	Evaluation on a national scale	
	For an exam, course project (work), practice, qualification work	For a credit
90 – 100	excellent	passed
82-89	good	
75-81		
69-74		
60-68	satisfactory	
35-59	not satisfactory with the possibility of retaking	not passed with the possibility of retaking
0-34	not satisfactory with obligatory repeated study of the discipline	not passed with obligatory repeated study of the discipline

REFERENCES

Preffered:

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- Marr, B. (2023). *Data Strategy: How to Profit from a World of Big Data, Analytics and Artificial Intelligence*(2nd ed.). Kogan Page, 409 p.

2. Provost, F., & Fawcett, T. (2023). *Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking* (2nd ed.). O'Reilly Media, 198 p.
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4. Sharma, R., & Singh, R. (2023). *Digital Transformation and Data Analytics in Management*. CRC Press, 144p.

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Softs:

MS Office, Tableau public, BI analitics

Рецензія на робочу програму (силабус) ОК **Data analytics and digitalization in management**

Розроблену викладачем кафедри менеджменту Сохань І.В.

Параметр, за яким оцінюється робоча програма (силабус) освітнього компонента гарантом або членом проєктної групи	Так	Ні	Коментар
Результати навчання за освітнім компонентом (ДРН) відповідають НРК			
Результати навчання за освітнім компонентом (ДРН) відповідають передбаченим ПРН (для обов'язкових ОК)			
Результати навчання за освітнім компонентом дають можливість виміряти та оцінити рівень їх досягнення			

Член проєктної групи ОП _____ (назва) _____ (ПІБ) _____ (підпис)

Параметр, за яким оцінюється робоча програма (силабус) освітнього компонента викладачем відповідної кафедри	Так	Ні	Коментар
Загальна інформація про освітній компонент є достатньою			
Результати навчання за освітнім компонентом (ДРН) відповідають НРК			
Результати навчання за освітнім компонентом (ДРН) дають можливість виміряти та оцінити рівень їх досягнення			
Результати навчання (ДРН) стосуються компетентностей студентів, а не змісту дисципліни (містять знання, уміння, навички, а не теми навчальної програми дисципліни)			
Зміст ОК сформовано відповідно до структурно-логічної схеми			
Навчальна активність (методи викладання та навчання) дає змогу студентам досягти очікуваних результатів навчання (ДРН)			
Освітній компонент передбачає навчання через дослідження, що є доцільним та достатнім для відповідного рівня вищої освіти			
Стратегія оцінювання в межах освітнього компонента відповідає політиці Університету/факультету			
Передбачені методи оцінювання дозволяють оцінити ступінь досягнення результатів навчання за освітнім компонентом			
Навантаження студентів є адекватним обсягу освітнього компонента			
Рекомендовані навчальні ресурси є достатніми для досягнення результатів навчання (ДРН)			
Література є актуальною			
Перелік навчальних ресурсів містить необхідні для досягнення ДРН програмні продукти			

Рецензент (викладач кафедри) _____ (назва) _____ (посада, ПІБ) _____ (підпис)