

	МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ	СУ СМЯ НУБіП України 7.5-072-05
	НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ	Введено в дію: Наказ № _____
	«Положення про робочу програму навчальної дисципліни»	від _____

NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of Geoinformatics and Aerospace Research of the Earth

APPROVED
Faculty of Land Management

May 15, 2025

CURRICULUM OF ACADEMIC DISCIPLINE

GEOINFORMATICS, COMPUTER SCIENCE AND PROGRAMMING

Area of knowledge	<u>19. Architecture and Construction</u>
Specialty	<u>193. Geodesy and Land Management</u>
Academic programme	<u>"Geodesy and Land Management"</u>
Faculty	<u>Land Management</u>
Developed by:	<u>Assistant Professor, PhD Anastasia HORODNYCHA</u>
	(position, academic degree, academic title)

Kyiv – 2025

Description of the academic discipline

The discipline "Geoinformatics, Computer Science and Programming" provides the formation of theoretical knowledge and skills in the use of computer technologies by land surveyors in their practical work. The basics of spatial thinking, the basics of geoinformatics, modeling of geographic objects in geoinformatics, working with vector data, familiarization with GIS and databases are considered. Students form basic ideas about geospatial information and its presentation, acquire practical skills in working with software tools, in particular Google Earth Pro .

Area of knowledge, specialty, academic programme, academic degree		
Academic degree	Bachelor`s	
Specialty	193. Geodesy and Land Management	
Academic programme	Geodesy and Land Management	
Characteristics of the discipline		
Type	Required	
Total number of hours	60	
Number of ECTS credits	2	
Number of modules	2	
Course project (work) (if any)	-	
Form of assessment	Exam	
Academic discipline indicators for full-time and part-time forms of higher education		
	Form of obtaining higher education	
	daytime	correspondence
Year of study	2	1
Term	3	2
Lectures	3 hours	2 hours
Practical classes and seminars	-	-
Laboratory classes	30 hours	-
Self-study	3 hours	-
Number of hours per week for full-time students	3 hours	-

1. Aim, competences and expected learning outcomes of the discipline

"Geoinformatics, Computer Science and Programming" is studied for the first three semesters and provides the opportunity to use computer technologies by specialists in the field of geodesy and land management in their practical work.

Competences acquired:

Integral competence (IC):

The ability to solve complex specialized problems in geodesy and land management.

General competence (GC):

GC01. Ability to learn and master modern knowledge.

GC02. Ability to apply knowledge in practical situations.

GC05. Ability to communicate in a foreign language.

GC06. Ability to use information and communication technologies.

GC07. Ability to work autonomously.

GC08. Ability to work in a team.

Total by module 1	35	6		14		15	1	1				
Module 2. Modeling geographic objects in geoinformatics												
Topic 1. Geographical fields and objects as the main entities of geographical space	7-8	4	2		4			1	1			
Topic 2. Vector and object models of spatial data	9-10	6	2		4							
Topic 3. Mosaic spatial data models	11-12	6	2		4							
Topic 4. From geoinformatics to GIS and databases	13-15	7	3		4							
Total by module 2	25	9		16		0						
Total hours	60	15		30		15	2	2				

3. Topics of lectures

№	Topic	Hours
1	From geography to geoinformatics	2
2	Basics of spatial thinking	2
3	Domains of geographic information	2
4	Geographical fields and objects as the main entities of geographical space	2
5	Vector and object spatial data models	2
6	Mosaic spatial data models	2
7	From geoinformatics to GIS and databases	3
	Total	15

4. Topics of laboratory classes

№	Topic	Hours
1	Getting to know the Google interface Earth Pro	2
2	Configuring Google Earth Pro software	2
3	Search and organize geographic search results using Google tools Earth Pro	2
4	Geometric Primitives on Google Earth Pro: Types, Creating, and Customizing Styles. Part 1.	2
5	Geometric Primitives on Google Earth Pro: Types, Creating, and Customizing Styles. Part 2.	2
6	Working with 4D data in Google Earth Pro.	2
7	Cartometric operations in Google Earth Pro, video presentation of work results	2
8	Basics of working with QGIS	2
9	Working with map layers. Part 1	2
10	Working with map layers. Part 2	2
11	Getting information about layer objects	2
12	Search for objects by attribute data	2
13	Cartometric operations	2
14	Map Layout. Part 1	2
15	Map Layout. Part 2.	2
	Total	30

5. Topics of self-study

№	Topic	Hours
1	Maps.visicom.ua – Ukrainian geospatial data portal	15
	Total	15

6. Methods and means of diagnosing learning outcomes:

- oral or written survey;
- discussions;
- speech with presentations;

- testing;
- defense of laboratory work;
- defense of essays.

7. Teaching methods :

- problem-based learning;
- practice-oriented learning;
- case method;
- visual method;
- flipped classroom;
- learning through research;
- video method;
- independent work.

8. Results assessment.

The knowledge of a higher education applicant is assessed on a 100-point scale and is converted into a national assessment in accordance with the current "Regulations on Examinations and Tests at the NULES of Ukraine"

8.1. Distribution of points by types of educational activities

Educational activity	Results	Assessment
Module 1. Fundamentals of Geoinformatics		
Topic 1. From geography to geoinformatics		
Laboratory work 1. Getting to know the Google interface Earth Pro	Know the prerequisites for the development of geoinformatics as a science and the basic techniques of Google's work Earth Pro Be able to customize the interface and set settings for working with the Google application Eatrh Pro Apply practical skills in working with software tools. ELO01; ELO04; ELO15	8
Laboratory work 2. Configuring Google Earth Pro Software		7
Topic 2. Basics of spatial thinking		
Laboratory work 3. Searching and organizing search results for geographic objects using Google tools Earth Pro	Know the basics of spatial thinking Be able to search and organize search results for geographic objects using Google tools Earth Pro Apply geometric primitives to represent objects and their display styles. ELO01; ELO02; ELO03; ELO09; ELO10; ELO11	5
Laboratory work 4. Geometric Primitives in Google Earth Pro: Types, Creating, and Styling. Part 1.		5
Self-study 1. Maps.visicom.ua – Ukrainian geospatial data portal		15
Topic 3. Domains of geographic information		
Laboratory work 5. Geometric Primitives in Google Earth Pro: Types, Creating, and Customizing Styles. Part 2.	Know the domains of geographic information Be able to work with 4D data in Google Earth Pro Apply practical skills in performing cartometric operations in Google Earth Pro. ELO01; ELO03; ELO09; ELO10; ELO11	10
Laboratory work 6. Working with 4D data in Google Earth Pro.		10
Laboratory work 7. Cartometric operations in Google Earth Pro, video presentation of the results of the work		10
Modular test 1.		30
Total by module 1		100

Module 2. Modeling geographic objects in geoinformatics		
Topic 1. Geographical fields and objects as the main entities of geographical space		
Laboratory work 8. Basics of working with QGIS	Know the essence of definitions of geographic fields and geographic objects Be able to customize the interface and set parameters for working with the QGIS program Apply practical skills in working with layers in QGIS. ELO01; ELO02; ELO03; ELO09; ELO10; ELO11	15
Topic 2. Vector and object models of spatial data		
Laboratory work 9. Working with map layers. Part 1	Know the advantages and disadvantages of representing spatial data through vector data models Be able to get information about layer objects. ELO01; ELO02; ELO03; ELO04; ELO15	5
Laboratory work 10. Working with Map Layers. Part 2		5
Laboratory work 11. Obtaining information about layer objects		10
Topic 3. Mosaic spatial data models		
Laboratory work 12. Searching for objects by attribute data	Know the advantages and disadvantages of representing spatial data through mosaic data models Be able to search for objects by attribute data Apply practical skills in performing cartometric operations. ELO02; ELO03; ELO04; ELO15	10
Laboratory work 13. Cartometric operations		10
Topic 4. From geoinformatics to GIS and databases		
Laboratory work 14. Map layout. Part 1	Know the basic concepts of geospatial information and its representation in GIS Be able to develop simple layouts Apply basic techniques for spatial data presentation ELO09; ELO10; ELO11; ELO15	10
Laboratory work 15. Map layout. Part 2.		5
Modular test 2.		30
Total by module 2		100
Educational work	(M1 + M2)/2*0.7 ≤ 70	
Exam	30	
Total per course	(Coursework + exam) ≤ 100	

8.2. Scale for assessing student's knowledge

Higher education applicant rating, points	Assessment according to the national system (exams/credits)
90-100	perfectly
74-89	good
60-73	satisfactorily
0-59	unsatisfactorily

8.3. Assessment policy

Deadlines and exam retaking rules	Works submitted after the deadline without good reason will be given a lower grade. Modules can be retaken with the permission of the lecturer if there are good reasons (for example, sick leave).
--	---

Academic Integrity Policy	Cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct text references to the literature used
Attendance Policy	at classes is mandatory. For objective reasons (e.g. illness, international internship), studies may be conducted individually (online upon agreement with the dean of the faculty).

9. **Educational and methodological support:**

- electronic educational course of the academic discipline (on the educational portal of the NUBiP of Ukraine eLearn - <https://elearn.nubip.edu.ua/enrol/index.php?id=707>);
 - lecture notes and their presentations (in electronic form - <https://elearn.nubip.edu.ua/enrol/index.php?id=707>);
 - textbooks, study guides, workshops;
 - methodological materials for studying the academic discipline for full-time and part-time higher education students.
- Methodical instructions for teaching practice in the discipline "Geoinformatics, Computer Science and Programming" (2nd year) / L. Primak, A. Moskalenko. – Kyiv, 2023. – 68 p.
 - Methodical instructions for teaching practice in the discipline "Geoinformatics, Computer Science and Programming" (1st year) / A. Moskalenko, O. Shykula, I. Shkvyr. – Kyiv, 2022. – 64 p.
 - Lecture notes on the discipline "Geoinformatics". Part 1 (for students of the direction of training "Geodesy, cartography and land management") / O. Shykula, I. Shkvyr, A. Moskalenko, T. Gez. – Kyiv, 2015. – 241 p.
 - Lecture notes on the discipline "Geoinformatics". Part II (for students of the direction of training "Geodesy, Cartography and Land Management") / O. Shykula, I. Shkvyr, A. Moskalenko. – Kyiv, 2015. – 305 p.

10. **Recommended sources of information**

Main:

1. Sandra L. Arlinghaus, Joseph J. Kerski, Ann Evans Larimore, Matthew Naud. Spatial Thinking in Environmental Contexts. Maps, Maps, Archives, and Timelines. 1st Edition. 2023. 248
2. Bolstad P., Manson S. GIS Fundamentals: A First Text on Geographic Information Systems. 7th Edition. 2022. 764 p.
3. Pavlysh V., Glinenko L., Shakhovska N. Fundamentals of Information Technologies and Systems. Lviv: Lviv Polytechnic. 2018. 620p.
4. Karpinsky Yu., Lyashchenko A., Lazorenko N., Kin D. Fundamentals of creating interoperable geospatial data. Kyiv. KNUBA. 2023.302 p.

Auxiliary:

5. James Holler. The Microsoft Office 365 Bible: The Most Updated and Complete Guide to Excel, Word, PowerPoint, Outlook, OneNote, OneDrive, Teams, Access, and Publisher from Beginners to Advanced. 2022. 359 p.
6. Alexander M., Kusleika D. Microsoft Excel 365 Bible. Wiley 2022. 1072

7. Ellen Lupton, Jennifer Cole Phillips. Graphic Design. New Basics. Kyiv: ArtHuss. 2019. 262 p.
8. Berinato S. Good Diagrams. Tips, Tools, and Exercises for Better Data Visualization. Kyiv: ArtHuss. 2022. 288 p.
9. Mark Lutz. Python. Programmer's Handbook. Kyiv: Naukovyi svit. 2023. 294 p.
10. Paul Berry. Head First. Python: An Easy-to-Understand Reference. Kharkiv: 2021. 624 p.
11. Shipulin V. D. Basic principles of geoinformation systems: a textbook. Kharkiv: KhNAMG, 2010. 313 p.
12. Moodle Documentation. URL: https://docs.moodle.org/403/en/Main_page
13. Word help & learning. URL: <https://support.microsoft.com/en-us/word>
14. Excel help & learning. URL: <https://support.microsoft.com/en-us/excel>
15. Python Language Reference. URL: <https://docs.python.org/uk/3/reference/index.html>
16. Online IDE - Code Editor, Compiler, Interpreter. URL: <https://www.online-ide.com/>
17. Google Earth Help. URL: <https://support.google.com/earth/?hl=en#topic=7364880>
18. QGIS User Guide. URL: https://docs.qgis.org/3.28/en/docs/user_manual/index.html