

NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF
UKRAINE

Department of Geoinformatics and Aerospace Research of the Earth

“CONFIRMED”

Dean of the Faculty of Land management

T.O. Ievsiukov

«21» May 2024

“APPROVED”

at the meeting of the department of Geoinformatics and
Aerospace Research of the Earth

Protocol № 12 from «16» May 2024

Acting head of Department

A.A. Moskalenko

”REVIEWED ”

Program Coordinator

Geodesy and Land Management

I.P. Kovalchuk.

PROGRAM OF THE COURSE
DIGITAL PLANS AND MAPS

Branch	of 19. Architecture and construction
knowledge	
Specialization	<u>193. Geodesy and Land management</u>
Educational	<u>"Geodesy and Land Management"</u>
program	
Faculty	<u>Land Management</u>
Developers	<u>Associate prof., PhD, Moskalenko A.A.</u>

Description of the course Digital plans and maps

Branch of knowledge, direction of education, specialty, educational-qualification level (EQL)		
Educational qualification level	Bachelor	
Specialty	193 Geodesy and Land management	
Educational program	Geodesy and Land management	
Discipline characteristic		
Type	Selected	
Total hours	120	
ECTS credits	4	
Thematic modules	2	
Course project (work) (if exist)		
type of examination	Final test	
Discipline parameters for full-time students and students studied by correspondence		
	full-time study	by correspondence
year of training	3	
semester	6	
lectures	15 hours.	
practical, seminar	- hours.	
laboratory	45 hours.	
self-dependent work	60 hours.	
individual work	- hours.	
Number of classroom hours (for full-time students) per week	4 hours.	

1. Purpose, objectives, and competencies of the course

Purpose of the course: The course "Digital plans and maps» provides obtaining skills of GIS cartographic modeling for land management and land cadaster.

Tasks of discipline is forming the specialist and subsequent practical use of technologies of GIS mapping in particular technologies of digital mapping knowledge and provide skills for collecting geographic information and work on a computer in ArcGIS environment, and GIS cartographic modeling.

Acquisition of competencies:

Integrated competency (IC)

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

- general competencies:

GK 01. Ability to learn and master modern knowledge.

GK 02. Ability to apply knowledge in practical situations.

GK 05. Ability to communicate in a foreign language.

GK 06. Ability to use information and communication technologies.

GK 09. Ability to interpersonal interaction.

GK 13. Ability to preserve, multiply moral, cultural, scientific values and achievements of society based on understanding of history, patterns of development of the subject area, its place in the general system of knowledge about nature and society, as well as in the development of society, technology and technology. activities for recreation and healthy living

- special competencies:

SC 01. Ability to apply fundamental knowledge to analyze phenomena of natural and man-made origin in the performance of professional tasks in the field of geodesy and land management.

SC 02. Ability to apply theories, principles, methods of physical and mathematical, natural, socio-economic, engineering sciences in performing tasks of geodesy and land management.

SC 03. Ability to apply regulations, regulatory and technical documents, reference materials in professional activities.

SC 04. Ability to choose and use effective methods, technologies and equipment for professional activities in the field of geodesy and land management.

SC 05. Ability to use modern information, technical and technological support to address complex issues of geodesy and land management.

SC 06. Ability to perform remote, ground, field and in-house research, engineering calculations for processing research results, prepare research results, prepare reports in solving problems of geodesy and land management.

SC 07. Ability to collect, update, process, critically evaluate, interpret, store, publish and use geospatial data and metadata on objects of natural and man-made origin.

SC 08. Ability to carry out professional activities in the field of geodesy and land management, taking into account the requirements of professional and civil safety, labor protection, social, environmental, ethical, economic aspects.

SC 09. Ability to use tools, instruments, equipment, facilities in the performance of geodetic and land management tasks.

SC 12. Ability to conduct technical control and assess the quality of topographic, geodetic and cartographic products.

SC 13. Ability to develop documentation on land management and land valuation, cadastral documentation, fill in the data of state land, urban and other cadastres

Program learning outcomes (PLO)

LR 1. Fluent in oral and written forms in state and foreign languages on professional matters.

LR 2. Organize and manage the professional development of individuals and groups.

LR 3. Communicate information, ideas, problems, solutions, personal experience and arguments to specialists and non-specialists.

LR 4. To know and apply in professional activity normative-legal acts, normative-technical documents, reference materials in the field of geodesy and land management and related branches.

LR 7. Perform surveys and survey, topographic and geodetic, cartographic, design and design and survey work in the performance of professional tasks in geodesy and land management.

LR 9. Collect, evaluate, interpret and use geospatial data, metadata on objects of natural and man-made origin, apply statistical methods of their analysis to solve specialized problems in the field of geodesy and land management.

LR 10. Choose and apply tools hardware, hardware and software supplies needed for remote, ground, field and in-house research in in the field of geodesy and land management.

LR 11. Organize and execute remote, ground, field and camera works in the field of geodesy and land management, draw up the results of work, prepare relevant reports.

LR 12. Develop documentation from land management, cadastral documentation and land valuation documentation with application computer technology, geoinformation systems and digital photogrammetry, to fill the state land with data, urban and other cadasters.

LR 13. Plan and execute geodetic, topographic and cadastral surveys, process the results in geographic information systems.

LR 15. Develop and adopt effective decisions on professional activities in the field geodesy and land management, including under conditions uncertainty.

**2. Program and structure of the course for:
– complete full-time (part-time) form of study;**

Modules and topics	Hours												
	full-time study							correspondence					
	weeks	total	including					total	including				
			l	p	lab	ind	s.w.		l	p	lab	ind	
1	2	3	4	5	6	7	8	9	10	11	12	13	
Semantic module 1. CARTOGRAPHY AND GEOINFORMATICS													
Theme 1. The main terminology in digital mapping	1-2	16	2		4		10						
Theme 2. Methods of displaying objects	3-4	22	2		10		10						
Theme 3. Standardization of geographic information	5-6	22	2		10		10						
Total by Semantic module 1		60	6		24		30						
Semantic module II. TECHNOLOGIES OF DIGITAL MAPPING													
Theme 4. Sources for digital mapping and map construction	7-8	12	2		4		6						
Theme 5. Technology of digital maps and plans design	9-10	16	2		6		8						
Topic 6. Spatial-logical relations of objects	11-12	14	2		4		8						
Theme 7. Classificatory of electronic map	13-15	18	3		7		8						
Total by Semantic module 2		60	9		21		30						
Total		120	15		45		60						

3. Laboratory class topics

№	Topic	Hours
1	Work with layers of basic map	2
2	Entering attribute data	2
3	Creation of dot symbols of a digital plan	2
4	Creation of linear conventional signs of a digital plan	2
5	Signatures as a component of linear conventional signs of the digital plan	2
6	Signatures as a component of polygonal conventional signs of a digital plan	2
7	Creation of polygonal conventional signs of a digital plan	2
8	Display of qualitative and quantitative attributes of the digital plan	2
9	Creation of localized diagrams	2
10	Simultaneous display of several attributes of a digital plan	2
11	Layout of the map	4
12	Create digital map layers by option	2
13	Binding of the base of the digital map by option	2
14	Vectorization of digital map point objects by option	2
15	Vectorization of linear objects of a digital map by option	2
16	Vectorization of polygonal objects of a digital map by option	2
17	Checking topological relations as a means of checking the quality of vectorization	2
18	Digital map editing by option	2
19	Filling the knowledge base of the digital map by option	2
20	Creation of charts, reports, digital map objects by option	2
21	Layout of a digital map by option	3
Total		45

4. Independent work topics

№	Topic	Hours
1	Professional terminology of digital maps and plans	10
2	Cartographic symbols. Representation of relief	10
3	Geoinformation mapping data formats	10
4	Data sources for creating digital maps and plans	6
5	Analysis of the use of digital maps and plans in various sectors (according to scientific articles and publications)	8
6	Application of the rules of topological relations	8
7	The knowledge base of digital maps	8
Total		60

5. Means of diagnosing learning outcomes:

- final test;
- module tests;
- essays;
- defence of laboratory work.

6. Teaching methods:

- verbal method (lecture, discussion, interview, etc.);
- practical method (laboratory, practical classes);
- visual method (illustration method, demonstration method);
- work with educational and methodical literature (summarizing, summarizing, annotating, reviewing, writing an abstract);
- video method (remote, multimedia, web-oriented, etc.);
- independent work (task performance).

7. Evaluation methods.

- final test;
- oral or written survey;
- modular testing;
- abstracts, essays;
- defence of laboratory works;
- presentations and speeches at scientific events.

8. **Distribution of points** received by students of higher education. The assessment of the knowledge of a higher education student takes place on a 100-point scale and is translated into national assessments according to the table. 1 of the current "Regulations on examinations and assessments at NUBiP of Ukraine"

Student rating, points	National grade based on exam results
90-100	Excellent
74-89	Good
60-73	Satisfactory
0-59	Unsatisfactory

In order to determine the rating of a student (listener) in the discipline R_{dis} (up to 100 points), the rating from the exam R_{ex} (up to 30 points) is added to the rating of a student's academic work R_{aw} (up to 70 points): $R_{dis} = R_{aw} + R_{ex}$.

9. Educational and methodological support

- electronic educational course of the educational discipline (on the educational portal of NUBiP of Ukraine eLearn - <https://elearn.nubip.edu.ua/course/view.php?id=108>; <https://elearn.nubip.edu.ua/course/view.php?id=106>);
- abstracts of lectures and their presentations (in electronic form - <https://elearn.nubip.edu.ua/course/view.php?id=108> ; <https://elearn.nubip.edu.ua/course/view.php?id=106>)
- textbooks, training aids, workshops;
- methodical materials on the study of the academic discipline for students of higher education full-time and part-time forms of higher education
 - ✓ Lecture notes for course «Digital plan and maps» (Конспект лекцій з дисципліни «Цифрові плани і карти» англійською мовою) / А. Moskalenko, S. Kokhan – Kyiv, 2023. – 96 p.
 - ✓ Methodological guideline for course «Digital plan and maps» (Методичні вказівки до виконання лабораторних робіт з

дисципліни «Цифрові плани і карти» англійською мовою) / А. Moskalenko, S. Kokhan – Kyiv, 2021. – 104 p.

- ✓ Кохан С.С., Москаленко А.А. Цифрові плани і карти. Навчально-методичний посібник для студентів напряму підготовки «Геодезія, картографія та землеустрій».-К.: ЦК «КОМПРИНТ», 2015.
- ✓ Кохан С.С., Москаленко А.А., Іванюта О.О., Новиков О.І. Цифрові плани і карти. Навчально-методичний посібник для студентів напряму підготовки «Геодезія, картографія та землеустрій».-К.: ЦК «КОМПРИНТ», 2014.

10. Recommended sources of information

Основна:

1. Antonio Ganga, Blaz Repe, Mario Elia (2023) Applications_of_GIS_and_Remote_Sensing_in_Soil_Environment_Monitorin. – MDPI. – 204p. (<https://doi.org/10.3390/books978-3-0365-9478-1>)
2. Основи створення інтероперабельних геопросторових даних. / Ю. О. Карпінський та ін. – Київ: КНУБА, 2023. – 302 с.
3. Huadong Guo, Michael F. Goodchild, Alessandro Annoni (2020) Manual of Digital Earth. – Springer Open. –846p. (<https://doi.org/10.1007/978-981-32-9915-3>)
4. ArcGIS for Environmental and Water Issues / William Bajjali. - 2018 - p.362
5. Honcu, A; Varga, R (2023) ARCGIS for mapping veteran settlements in the province of upper Moesia. JOURNAL OF ANCIENT HISTORY AND ARCHAEOLOGY. Volume10. Issue1. - Page10-21. DOI10.14795/j.v10i1.823
6. Moskalenko A. Geoinformation mapping for providing the rational use and protection of soil. Mechanization in agriculture & Conserving of the resources. 65 (2019), 186-189

Додаткова:

7. Moskalenko A. GIS support of forming spatial decisions on land use // International Scientific Journal Mechanization in agriculture & Conserving of the resources, Vol. 67 (2021), Issue 3, p.79-81.
8. Kokhan S., Moskalenko A, Drozdivskyi O. (2018) Quantitative Land Suitability Mapping for Crop Cultivation/ Communications - Scientific Letters of the University of Zilina, 77-83
9. Геоінформаційні системи і бази даних : монографія. – Кн. 2 / В. І. Зацерковний, В. Г. Бурачек, О. О. Железняк, А. О. Терещенко. – Ніжин : НДУ ім. М. Гоголя, 2017. – 237с.
10. Козаченко Т. І. Геоінформаційне картографування малих підприємств України [Електронний ресурс] / Т. І. Козаченко, Т. С. Цокало // Вісник геодезії та картографії. - 2009. - № 4. - С. 17-27. - Режим доступу: http://nbuv.gov.ua/UJRN/vgtk_2009_4_5
11. Географічна інформація. Еталонна модель: ДСТУ ISO 19101:2009. – [Чинний від 2011-07-01] – К.: Держспоживстандарт України, 2011. – 44 с.

12. СОУ 742-33739540 0011:2010 "Комплекс стандартів База топографічних даних Каталог об'єктів і атрибутів" // 30.09.2010.

13. СОУ ISO 19113 "Комплекс стандартів База топографічних даних Принципи оцінки якості топографічних даних" // 30.09.2010.

14. СОУ 742-33739540 0012:2010 "Комплекс стандартів. База топографічних даних. Правила кодування та цифрового опису векторних даних" Том 2 // 30.09.2010.

15. The ArcGIS Book [Електронний ресурс] // [сайт] / Режим доступу: <https://learn.arcgis.com/en/arcgis-book/> – назва з екрану.

«СХВАЛЕНО»

Вченою радою факультету землевпорядкування
Протокол № 9 від 21 травня 2024 року

Голова вченої ради _____ Тарас ЄВСІЮКОВ