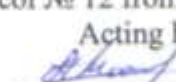


Department of Geoinformatics and Aerospace Research of the Earth

**"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

 A.G. Martyn

## PROGRAM OF THE COURSE

### GIS IN CADASTRAL SYSTEMS

Branch of knowledge	19. Architecture and construction
Specialization	193. Geodesy and Land management
Educational program	"Geodesy and Land Management"
Faculty	Land Management
Developers	Dr. Sci., Associate prof., Koshel A.O. Associate prof., PhD, Moskalenko A.A.

### Description of the discipline GIS in cadastral systems

<b>Branch of knowledge, direction of education, specialty, educational-qualification level (EQL)</b>		
Educational-qualification level	Master	
Specialty	193 Geodesy and Land management	
Educational program	Geodesy and Land management	
<b>Discipline characteristics</b>		
Type	Normative	
Total hours	120	
ECTS credits	4,0	
Thematic modules	2	
Course project (work) (if exist)		
type of examination	Exam	
<b>Discipline parameters for full-time students and students studied by correspondence</b>		
	full-time study	by correspondence
year of training	2	
semester	3	
lectures	- hours	
practical, seminar	- hours	
laboratory	30 hours	
self-dependent work	90 hours	
individual work	- hours	
amount of self-dependent work per week, hours	3 hours	

## 1. Мета і завдання навчальної дисципліни / Purpose and tasks of the discipline

Discipline "GIS in cadastral systems" provides the opportunity to use for the national cadastral system and land management software and hardware for automated accounting, storage, display, analysis, modeling of spatially coordinated information.

**Aim of the discipline** is learning and gaining master students and acquire the necessary theoretical knowledge and practical skills in the use of geographic information systems in creating cadastral systems and the formation of knowledge about the development of cadastral systems of Ukraine and the world, the contribution of Ukrainian and foreign scientists.

**Tasks of discipline** is forming the specialist and subsequent practical use of technologies of GIS in land management and land cadaster to take stock of land resources and land owners predicting the state land fund, monitor the use and protection of soil, registration and protection of the rights of citizens and businesses and more. Understand the significance of GIS tools in land consolidation projects and identify various types of GIS tools that can be used. Ability to utilize GIS tools in land consolidation, such as enhancing project planning, stakeholder engagement, and decision-making processes. Collect and manage spatial data using GIS tools and understand the importance of spatial data in land consolidation projects. Utilize GIS tools to prepare maps as part of a land consolidation project and understand the role of maps in facilitating effective communication and decision-making among stakeholders involved in land consolidation.

**- general competencies:**

GC01. Ability to identify, formulate and solve problems;

GC04. Ability to generate new ideas (creativity);

GC05. Ability to adapt and act in a new situation.

**- special competencies:**

SC01. Ability to plan and perform theoretical and/or applied research, create new knowledge and technologies in the field of geodesy and land management;

SC03. Ability to effectively apply the theories, principles and technologies of mathematics, natural, technical, social, economic sciences in solving complex problems of geodesy and land management;

SC04. Ability to search for the necessary information, select and apply modern methods of processing, analysis, evaluation and publication of data, including geospatial data and metadata in solving complex problems of geodesy and land management;

SC05. Ability to substantiate and evaluate methods of surveys, surveys, tests, diagnostics, monitoring of geodesy and land management objects;

SC09. Ability to develop and apply new strategic approaches to solving problems in the field of geodesy and land management.

**Programme learning outcomes:**

RN03. To make effective decisions on solving applied, research and/or innovative problems in the field of geodesy and land management, analyse alternatives, make forecasts, assess risks, in particular in conditions of incomplete and/or contradictory information and ambiguous requirements;

RN04. To build and research conceptual, mathematical and computer models of objects and processes, apply them to create innovations in the field of geodesy and land management;

RN05. To create and develop geospatial data infrastructures, process and publish geospatial data and metadata related to geodesy and land management;

RN07. To justify the choice of equipment, technologies and processes for production management and research in the field of geodesy and land management and related fields;

RN09. To develop and implement measures for operational and prospective management, forecasting and planning of geodetic, cartographic and land management production, taking into account available resources and time constraints;

- RN11. To perform a comprehensive analysis and assessment of the state of geodesy and land management objects and assess the consequences of the implementation of practical measures;
- RN13. Perform surveys, tests, diagnostics, monitoring of geodesy and land management objects, develop land protection measures and assess their consequences;
- RN14. To critically comprehend current problems and promising directions of development of geodesy and land management, related interdisciplinary issues.

## 2. Program and structure of the course

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	
<b>SEMANTIC MODULE I. Experience of cadastral projects regional and national level by using GIS technology</b>													
Theme 1. GIS - technologies in land cadastre. Geographic information systems of land cadastre in Ukraine. Collection and management of geospatial data using GIS tools.	1-2	34	0		6		28						
Theme 2. Features of cadastral systems in foreign countries.	3-4	26	0		8		18						
<b>Total by Semantic module 1</b>		<b>60</b>	<b>0</b>		<b>14</b>		<b>46</b>						
<b>SEMANTIC MODULE II. Object Model of cadastral database</b>													
Theme 3. Data on the land fund and ways of displaying it. Basic concepts of cadastral database. Server-based GIS. Preparation of maps (plans) as a component of land consolidation projects.	5-6	18	0		4		14						
Theme 4. GIS tools and their importance in land consolidation projects. Different types of GIS tools and how they can be used in land consolidation.	7-8	21	0		6		15						
Theme 5. The benefits of using GIS tools in land consolidation, including their ability to improve project planning, stakeholder engagement and decision-making processes.	9-10	21	0		6		15						
<b>Total by Semantic module 2</b>		<b>60</b>	<b>0</b>		<b>16</b>		<b>44</b>						
<b>Усього годин</b>		<b>120</b>	<b>0</b>		<b>30</b>		<b>90</b>						

## 3. Laboratory class topics

№	Topic	Hours
1	Using GIS tools to calculate the monetary value of an individual land plot and land consolidation projects	6
2	Construction of sanitary and coastal protection zones around objects with special regulations. Analysis zones around objects with special regulations	8
3	The selection of information from the geodatabase by location and by attributes	4
4	Data analysis using ArcGIS tools	6
5	Data analysis using ArcGIS Online tools	6
<b>Total</b>		<b>30</b>

## 4. Independent work topics

№	Topic	Hours
1	Professional terminology for GIS in cadastral systems	6
2	GIS - technology in land cadaster. Automated land cadaster in Ukraine.	10
3	Experience in cadastral projects regional and national levels using GIS technology	12
4	Features cadastral systems in foreign countries.	6

5	World experiences to build and use cadaster and registry	12
6	Concepts of cadastral database	4
7	Models of cadastral databases	10
8	Data on the land fund and its displaying	5
9	Use of GIS in various industries	10
10	Server GIS	5
11	Comparison of database models architecture used in cadastral systems	10
<b>Total</b>		90

#### 5. Means of diagnosing learning outcomes:

- exam;
- module tests;
- essays;
- protection 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.

- exam;
- 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=1715>);
- abstracts of lectures and their presentations (in electronic form - <https://elearn.nubip.edu.ua/course/view.php?id=1715>);
- 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

1. Географічні інформаційні системи в кадастрових системах (методичні вказівки до виконання лабораторних робіт) – Київ: ЦП «КОМПРИНТ», 2018. – 40 с.
2. GIS in Cadastral Systems (навчально-методичний посібник) / Кохан С.С., Москаленко А.А., Кошель А.О., Дьоміна І.І.) – Київ: ЦП «КОМПРИНТ», 2020. – 88 с.

#### **10. Recommended sources of information**

3. ArcGIS for Environmental and Water Issues / William Bajjali. - 2018 - p.362
4. Мартин А.Г., Палеха Ю.М., Євсюков Т.О., Кошель А.О. Геоінформаційне забезпечення оціночного районування територій громад в Україні. Сучасні досягнення геодезичної науки та виробництва. 2022. Випуск I (43). С. 121–126.
5. Martyn A., Koshel A., Palekha Y., etc. (2020). Normative monetary valuation of land: on the way to unification and renewal of methodology. Land Management Bulletin, No. 8, 24–31
6. Геоінформаційні системи і бази даних : монографія / В. І. Зацерковний, В. Г. Бурачек, О. О. Железняк, А. О. Терещенко. – Ніжин : НДУ ім. М. Гоголя, 2014. – 492 с.
7. 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. – 237 с
8. Martyn A. G., Lukhograd O. M., Koshel A. O. (2017). Features of Monetary Valuation of Lands of Settlements of Ukraine in Terms of Market Relations [Text]: monograph / NULES of Ukraine. Kyiv: Comprint, 300 p.
9. Географічні інформаційні системи: Посібник/ За ред. М. Ван Мерввіна, С.С.Кохан.- К.: НАУ. 2003.-206 с.
10. Patichenko O. M. (2018). Constructive-geographical principles of normative monetary valuation of lands of settlements with the use of geoinformation technologies: abstract of the dissertation of the cand. of geogr. sciences: 11.00.11; Kyiv National University named after Taras Shevchenko. Kyiv, 20 p.
11. Національний стандарт України «ДСТУ ISO 19101:2009 Географічна інформація. Еталонна модель (ISO 19101:2002, IDT)»// 2009-10-15.
12. COU ISO 19136:2009 "Обмінний формат геопросторових даних на основі географічної мови розмітки GML (ISO 19136:2007)" // 30.09.2010
13. COU 742-33739540 0012:2010 "Комплекс стандартів База топографічних даних Правила кодування та цифрового опису векторних даних" Том 2 // 30.09.2010

#### **Additional:**

14. Основи геоінформаційних систем. Методологія. В.М.Самойленко. Навчальний посібник. –К.: Ніка-Центр.-2003.-276 с.
15. Єршов В.П., Гора І.М. Автоматизовані земельні інформаційні системи. Учбовий посібник. –К.: НАУ. 1999.- 196 с.

#### **14. Information resources:**

16. eLearn webpage - <https://elearn.nubip.edu.ua/course/view.php?id=1597>
17. ГІС рішення [Електронний ресурс]. – Режим доступу: <http://ndiasb.kiev.ua/ua/teren.php>
18. Законодавство України [Електронний ресурс]. – Режим доступу: <http://rada.gov.ua>