NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE
FACULTY OF LAND MANAGEMENT

"APPROVED"
Dean of the faculty
_____ T.O. Ievsyukov
«___» _____ 2021 y.

REVIEWED AND APPROVED
on meeting of department Geoinformatics
and Aerospace Research of the Earth
Protocol № 15 from 11 May 2021 y.

Head of department of Geoinformatics and
Aerospace Research of the Earth
_____ S.S. Kohan

EDUCATIONAL – METHODOLOGICAL COMPLEX

of the discipline

GEOINFORMATION LAND AND CADASTRAL SYSTEMS

Field of knowledge	19. Architecture and Construction
Specialty	Field of knowledge
Specialization	
Faculty	Land Management
Created by	Associate prof., PhD in economics, A.O. Koshel

KYIV — 2021

NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of geographic information systems and technologies

THE WORK PROGRAMM OF EDUCATIONAL DISCIPLINE
GEOINFORMATION LAND AND CADASTRAL SYSTEMS

Field of knowledge   19. Architecture and Construction
Specialty   Field of knowledge
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Faculty   Land Management
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Kyiv – 2021 y

The work program
discipline « **GEOINFORMATION LAND AND CADASTRAL SYSTEMS**» for students of
course training for students by direction 193. Geodesy and land management

Authors Associate prof., PhD in economics, A.O. Koshel

Approved by department of department of Geoinformatics and Aerospace Research of the Earth,
Protocol № 15, 11 May 2021 y.

Head of department of department of Geoinformatics and Aerospace Research of the Earth

"11"травня__ 2021   _____   (S.S. Kokhan)
                            (signature)   (name)

Approved by the Educational Council of Faculty of land management department
Protocol № __ from "__"_____ 2021 y.

"13_"_____ 2021   Head _____ (T.O. Ievsiukov)
                                             (signature)   (name)
                                               (підпис)   (прізвище та ініціали)

1. Descreption of the course
GEOINFORMATION LAND AND CADASTRAL SYSTEMS

Industry knowledge training direction, specialty, education level	
Educational qualification	Bachelor
Field of knowledge	19. Architecture and Construction
Specialty	Field of knowledge
Specialization	
Description of the course	
Type	Sample
Total number of hours	90
Number of credits ECTS	3
Number of content modules	2
Course project (work)	-
Form of Control	Final test
Descriptions of the course for full-time and distance learning	
	Full-time
Year of training	3
Semester	2
Lectures	15
Practical, seminars	-
Laboratory studies	30
Independent work	45
Individual tasks	-
Number of weekly hours for full-time study: classroom	3

2. Task and purpose of the discipline
GEOINFORMATION LAND AND CADASTRAL SYSTEMS

Discipline "Geoinformation land and cadastral systems" provides the ability to create software and hardware geoinformation complex for recording, storage, display, analysis, geodata modeling of the State Land Cadastre.

Aim

The purpose of the course is to master and acquire the necessary theoretical knowledge and practical skills in the field of geoinformation support of the state land cadastre and knowledge formation on the development of geoinformation land cadastral national systems of Ukraine and the world, the contribution of Ukrainian and foreign scientists.

Task

The task of studying the discipline is to form a specialist's theoretical knowledge and practical skills of geoinformation support of land cadastral works for planning the development of territories, inventory of land resources, forecasting the state of the land fund, control over the use and protection of soils.

As a result of studying the discipline the student must know:
- basics of building land information systems. Basic concepts of geoinformation support of land cadastre;
- regulatory and legal support and standardization of components of geographic information land cadastral systems;
- equipment and software for the implementation of geographic information land cadastre system.
- information modeling;
- models of databases and data banks;
- functions of land information systems;
- information base of the National Cadastral System (hereinafter NCS;
- the concept of creating NCS;
- basics of analysis and cartographic modeling;
- cartographic support of DZK, cartographic projections and coordinate systems;
- basics of creating land cadastral information;
- methods and techniques of geoinformation processing of land cadastral information, methods of analysis, modeling, forecasting and updating of data;

As a result of studying the discipline the student must be able to:
- use hardware and software to solve practical problems of maintaining a geographic land cadastral system;
- collect geographical information;
- define point, linear objects and objects in the form of polygons based on their attributes;
- use hardware and software geoinformation software to solve practical problems aimed at conducting information technology processes related to the use of data of the state land cadastre;
- be able to apply geographic information cadastral systems for the purpose of feasibility study of use and protection of land resources.

The discipline provides the formation of a number of competencies:
general competencies:
- 3K01. Ability to learn and master modern knowledge;
- 3K06. Ability to use information and communication technologies.
special competencies:
- SK05. Ability to use modern information, technical and technological support to solve complex issues of geodesy and land management;

- SK07. Ability to collect, update, process, critically evaluate, interpret, store, publish and use geospatial data and metadata on objects of natural and man-made origin;
- SK13. Ability to develop land management and land valuation documentation, cadastral documentation, fill in state land, urban planning and other cadastres.

Program learning outcomes:
- PH9. 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;
- PH10. Select and apply tools, equipment, hardware and software necessary for remote, ground, field and in-house research in the field of geodesy and land management;
- PH12. Develop land management documentation, cadastral documentation and land valuation documentation using computer technology, geographic information systems and digital photogrammetry, fill in the data of state land, urban planning and other cadastres;
- PH13. Plan and perform geodetic, topographic and cadastral surveys, process the results in geographic information systems.

3. Program and structure of the discipline
GEOINFORMATION LAND AND CADASTRAL SYSTEMS
for a full-time study form

CONTENT MODULE I. BASIC CONCEPTS ABOUT GEOINFORMATION SUPPORT OF LAND CADASTRE.

Topic 1. Objectives and content of the course. The concept of geoinformation support of land cadastre.

Introduction to the course. Basic concepts and definitions. Requirements for geographic information land cadastral systems.

Topic 2. Regulatory documents and standardization in the study of the discipline "Geoinformation land cadastral systems".

The main legal documents governing the creation and operation of geographic land cadastral systems. International standards.

Topic 3. Equipment and software for the implementation of geographic land cadastral system.

Hardware, basic equipment and software available on the market to create and make geographic information land cadastral systems.

Topic 4. Geoinformation modeling. Land cadastral databases. Data banks.

Types of land cadastral databases and data banks. Geoinformation modeling of land cadastral data.

Topic 5. Functions of land information systems.

Geoinformation land cadastral systems as components of land information systems. The main functions and tasks that solve land information systems.

CONTENT MODULE II. The concept of creating geographic information land cadastral systems.

Topic 6. Information base of geoinformation systems. The concept of creating geographic information land cadastral systems.

The basis of the source of geospatial information for the creation of geographic land cadastral systems. Components of the information base of geographic information systems and land cadastre. Conceptual bases, principles, architecture of creation of cadastral geoinformation systems.

Topic 7. Fundamentals of analysis and cartographic modeling. Cartographic support of DZK.

The main tasks of GIS-analysis in geoinformation land cadastral systems. Cartographic modeling using geographic information systems. Cartographic support of the State Land Cadastre, its types.

Topic 8. Basics of creating land cadastral information. Cartographic methods of working with land cadastre. Index cadastral map (plan).

Principles of creating land cadastral information. Basics of creating and working with digital index cadastral maps (plans).

full-time study form:

Titles content modules and themes	Hours											
	Full-time form						By correspondence					
	total	including					total	including				
		l	p	lab	ind	i.w.		l	p	lab	ind	i.w.
1	2	3	4	5	6	7	8	9	10	11	12	13
Content module I. Basic concepts of geoinformation support of land cadastre.												
Topic 1. Objectives and content of the course. The concept of geoinformation support of land cadastre.	9	2		2		5	1	1				
Topic 2. Regulatory documents and standardization in the study of the discipline "Geoinformation land cadastral systems".	9	1		2		4	1	1				
Topic 3. Equipment and software for the implementation of geographic land cadastral system.	9	1		4		5	1			1		
Topic 4. Geoinformation modeling. Land cadastral databases. Data banks.	9	2		4		5	1			1		
Topic 5. Functions of land information systems.	9	2		3		4	2	1		1		
Together for the semantic module 1	45	8		15		23	6	3		3		
Content module II. The concept of creating geographic information land cadastral systems.												
Topic 6. Information base of geoinformation systems. The concept of creating geographic information land cadastral systems.	15	3		5		7	1	1				
Topic 7. Fundamentals of analysis and cartographic modeling. Cartographic support of SLC.	15	2		5		7	3	1		1		
Topic 8. Basics of creating land cadastral information. Cartographic methods of working with land cadastre. Index cadastral map (plan).	15	2		5		8	3	1		2		
Together for the semantic module 2	45	7		15		22	7	3		3		

	90	15		30		45	12	6		6		

4. Themes of seminars

№	Name of theme	Hours

5. Topics of practical classes

№	Name of theme	Hours

6. Topic of laboratory classes

№ c/o	Name of topic	Number of hours
1	**Topic 1: Creation of vector layers of an indo-cadastral map (plan).** Downloading land cadastral data (shapefiles) in the ArcGIS environment and creating new polygon layers: the boundaries of the area, the boundaries of village councils, boundaries of settlements, cadastral zones and cadastral districts.	2
2	**Topic 2: Vectorization of land cadastre data..** Vectorization of cadastral zones, quarters within the territory of the district.	6
3	**Topic 3. Creation of database structure and introduction of land cadastral attributive information.** Functions of selection of land cadastral geodata by attributes. Finding and changing cadastral geodata records in data gobag. Adding new columns to the registry. Create additional fields in the table of attributes of land cadastral geodata.	6
4	**Topic 4. Creating the layout of graphic materials**. Counts for layout: map projections, shape of the depicted territory, orientation of the image, heterogeneity of the image of neighboring territories, map legend, presence or absence of additional elements, assignment of the map.	6

5	**Topic 5. Layout of graphic materials. Creation of the index-cadastral map of the district and a separate administrative-territorial unit.**	4
	Queries like a form of information search. Search, extract, replace, enter geodata using queries. Processing of the entered land cadastral geodata. Placing a cartographic image, the name of the map of the symbols, the line and other auxiliary equipment of the card within the sheet.	
6	**Topic 6. Filling the geodatabase with attribute land cadastral geodata. Land cadastral geodata and their characteristics.**	4
	Convert CAD geodata format (.DWG (AvtoCAD)) into a shaped file (ArcGIS). Attach an attribute table to a shape file. Layout of graphic materials. Creation of a cadastral quarter plan and land plot layout.	
7	**Topic 7. Introduction of the land cadastre geodata to the existing database**	4
	Add CAD files (.DWG (AvtoCAD)) to the project. Create objects by existing coordinates. Creation of objects by points which are added from the external tables of the results of geodetic surveys. Introduction of new data in the database of land plots.	
Total		**30**

7. Individual tasks

TASK 1

The purpose of creation and functional purpose of geoinformation land cadastral systems.

Software platforms for LIS development.

TASK 2

The main functions and composition of geographic information support of cadastral systems.

The essence of entering cartographic data in the LIS.

TASKS 3

Characteristics of the object in geoinformation land cadastral systems.

Principles of construction of geoinformation land cadastral systems.

TASK 4

Land information systems: prerequisites and functions.

The composition of the index map of the state land cadastre.

TASK 5

The concept of geographic land cadastral systems. Prerequisites, goals and basic principles of creation.

Errors of digitization of cartographic data.

TASK 6

Technical support of geoinformation land cadastral systems.

Input and output data of geoinformation land cadastral systems, their suppliers and consumers.

TASK 7

Architecture of geoinformation land cadastral systems.

Information support of geographic information land cadastral systems of the basic level.

TASK 8

Composition and content of attributive data of geoinformation land cadastral systems.

Errors in digitizing map data.

TASK 9

Prerequisites for the creation and functions of geographic land cadastral systems.

Basic level geographic information cadastral systems software.

TASK 10

The essence and basic concepts of informatization.

Input and output data of geoinformation land cadastral systems, their suppliers and consumers.

TASKS 11

The concept of geographic land cadastral systems. Prerequisites, goals and basic principles of creation.

The structure of software and information support of geoinformation land cadastral systems of the basic level.

TASK 12

The main directions, forms, state and prospects of informatization in land management.

Methods of entering cartographic data into the land information system.

TASKS 13

The concept of geographic land cadastral systems. Prerequisites, goals and basic principles of creation.

Raster data formats and their use in LIS.

TASKS 14

Input and output data of geoinformation land cadastral systems, their suppliers and consumers.

Attribute data input technology.

TASK 15

Functions of geoinformation land cadastral systems.

Errors of digitization of cartographic data.

TASK 16

The main functions and composition of information support of geoinformation land cadastral systems. Information database of geoinformation land cadastral systems.

Use of cartographic models for feasibility study and rational use of land.

TASKS 17

Problems of legal support of creation and functioning of geoinformation land cadastral systems.

Principles of entering and editing attribute data.

TASK 18

The purpose of creation and functional purpose of geoinformation land cadastral systems.

Input and output data of geoinformation land cadastral systems, their suppliers and consumers.

TASKS 19

Functions of geoinformation land cadastral systems.

Principles of entering and editing cartographic data.

TASK 20

The essence and basic concepts of informatization, its effectiveness.

The purpose of creation and functional purpose of geoinformation land cadastral systems.

TASKS 21

Software and information support of geoinformation land cadastral systems.

Vector data model. Their characteristics and use.

TASKS 22

The main functions and composition of information support of geoinformation land cadastral systems. Information database.

Digital cadastral maps. Their purpose and use.

TASKS 23

Geographic information systems in the land cadastre: requirements and prospects for application.

The essence of spatial analysis in LIS. Analysis of cartographic data.

TASKS 24

Basic concepts of land information system. Functions, subsystems.

Principles of construction of geoinformation land cadastral systems.

TASK 25

Input and output data of geoinformation land cadastral systems, their suppliers and consumers.

Spatial analysis and cartographic modeling of LIS. Attribute data analysis.

TASK 26

Principles of creation and functioning of distributed databases.

Geospatial data for the state land cadastre. Blocks of land cadastral data on agricultural lands.

TASKS 27

Requirements for land cadastre databases.

The place of GIS and data of remote sensing of the Earth in geoinformation land cadastral systems.

TASKS 28

Information connections of geoinformation land cadastral systems.

Organization of automated registration of land holdings, land uses and real estate on their territory. Organization of processing of accounting for the quantity and quality of land.

TASKS 29

The concept of land cadastral data.

The concept of creating geographic information land cadastral systems.

TASK 30

Architecture of geoinformation land cadastral systems.

AIS and the possibility of their use in land management.

8. Teaching Methods

In conducting lectures appropriate to use verbal teaching methods: explanation, narration, discussion, educational debate, with a combination of visual learning methods: illustration, showing.

In carrying out laboratory work should be used such as verbal learning method of instruction on the combination of visual learning methods of illustration and demonstration, the aspect of these studies is that they facilitate communication theory and practice, providing students acquiring skills using standard and specialized software , application of information technology to cadastral and form students' initial skills of research activities. Laboratory work in the laboratory are equipped computers.

9. Forms of control

The main methods of control of knowledge and skills students have to study the subject are: oral examination, written and practical test, standardized control in the form of modular test papers, assessment for individual learning task, the final test.

The total value of these methods is to make the best possible to ensure timely and comprehensive feedback between students and teachers, by which establishes how students perceive and learn the material.

The purpose determines the choice of control methods, it should be borne in mind that these methods can be applied in all kinds of control - only complete applications allows regularly and

objectively identify the dynamics of the formation of knowledge and skills of students. Each control method has its advantages and disadvantages, scope of application, none of them can not be the only one able to diagnose all aspects of the learning process. So:

- To control the absorption of lectures: oral questioning, written modular test papers, current testing score for an individual learning task, the final test.
- - For the monitoring and evaluation of laboratory work: practical test and evaluation of each laboratory work.

10. Ratio between national and ECTS values and rating from the discipline

Student Assessment takes place according to "On the examinations and tests NUBiP Ukraine" dated 12/27/2019. The protocol №5.

National value	Rating, points
EXCELLENT	90-100
GOOD	74-89
SATISFACTORY	60-73
UNSATISFACTORY	0-59

To determine the ranking of mastering discipline student RDYS (100 points) received certification RAT ranking (30 points) added to the student rating for Academic RNR (70 points): RDYS RNR = + RAT.

11. Methodological Support

1. Автоматизація державного земельного кадастру: методичний посібник / С.С.Кохан, А.О. Кошель, І.М.Шквир – Київ, 2014. – 46 с.

12. Suggested Reading

Basic

1. Земельний кодекс України : Закон України від 25.10.2001 №2768-III. URL: http://zakon3.rada.gov.ua/laws/show/2768-14. (дата звернення: 26.03.2021).
2. Про Державний земельний кадастр : Закон України від 07.07.2011 № 3613-VI. URL: http://zakon3.rada.gov.ua/laws/show/3613-17, вільний. – (дата звернення:24.04.2021)
3. Enemark, S. (2008). Environment and Land Administration - Focus on Rights, Restrictions and Responsibilities, FIG Com 7, International Symposium, Verona.
4. ESRI Parcel Fabric (2015) ArcGIS Help 10.3, http://desktop.arcgis.com/en/desktop/latest/manage-data/editing-parcels/what-is-a-parcel-fabric-.htm
5. INSPIRE Data Specification on Cadastral Parcels (2014) Technical Guidelines 3.1. URL: http://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_CP_v3.1.pdf
6. Parcel Fabric Section (2015) Operational Documents, Integrated Land Management Bureau, BC. URL: http://apps.gov.bc.ca/pub/pip/jsp/operationalpage/operdoc.jsp
7. ISO 19152 (2012) Geographic information - Land Administration Domain Model (LADM), ISO TC 211/SC, International Organization for Standardization, http://www.iso.org/iso/catalogue_detail.htm%3Fcsnumber%3D51206.

8. Національний стандарт України «ДСТУ ISO 19101:2009 Географічна інформація. Еталонна модель (ISO 19101:2002, IDT)» 2009-10-15.
9. СОУ ISO 19136:2009 "Обмінний формат геопросторових даних на основі географічної мови розмітки GML (ISO 19136:2007)" // 30.09.2010
10. СОУ 742-33739540 0012:2010 "Комплекс стандартів База топографічних даних Правила кодування та цифрового опису векторних даних" Том 2 // 30.09.2010

Support

1. Mondal S, Bandyopadhyay J, Chakravarty D (2015) Land Information System using cadastral techniques, Mining Area of Raniganj, Barddhaman district, India. Int J Remote Sens Appl (IJRSA) 5:45–53
2. Mondal, S., Chakravarty, D., Bandyopadhyay, J. et al. GIS based Land Information System using Cadastral model: A case study of Tirat and Chalbalpur rural region of Raniganj in Barddhaman district. Model. Earth Syst. Environ. 2, 120 (2016).

13. Information Resources

1. Закон України «Про національну інфраструктуру геопросторових даних» від 19.05.2020. 2020 р., № 38, стор. 7, стаття 1237, код акту 99063/2020.
2. Cadastral surveys and records of rights of land. URL: http://www.fao.org/3/v4860e/v4860e03.htm
3. Законодавство України [Електронний ресурс]. URL: http: http://rada.gov.ua