Educational-qualification level - Bachelor
Specialty 193. Geodesy and Land Management
Educational program «Geodesy and Land management»
Year of study 3**, semester** 6
Mode of study: full
ECTS hours – 4,0
Language: English

Instructor	Antonina Moskalenko, PhD, Associate Professor
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eLearn webpage	https://elearn.nubip.edu.ua/course/view.php?id=106

Course Overview:

The course "Digital Plans and Maps" introduces students the basics of digital mapping and the possibilities of GIS application in creating of digital cartographic products. The course covers issues related to the requirements for digital plans and maps, and the ways to displaying objects, determining the quality of digital cartographic data, as well as spatial data formats, technologies of designing digital plans and maps, and encoding cartographic information.

The course provides obtaining the capabilities in creating and filling basic cartographic layers, making plans based on vector models, editing spatial and attribute data, designing cartographic materials with the formation of a set of topographic symbols in ArcGIS-ArcMap and cartographic signs for individual thematic layers.

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

The aim of the discipline: To learn main principle, methods and means of geoinformation mapping to use in land management and land cadaster.

Tasks of the discipline: formation theoretical knowledge in the area of GIS mapping and obtaining practical skills in GIS applications in designing digital plans and maps.

The discipline provides the formation of a number 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.

The course Program and Structure

Topic	Hrs (lectures /laboratory/ individual)	Education result	Tasks	Grade
6 semestr				
SEMANTIC MODULE I. CARTOGRAPHY AND GEOINFORMATICS				
Theme 1. Terminology in digital mapping	2/4/10	**Know** the requirements for digital maps and plans **Understand** the possibilities of using digital plans and maps in their professional activities **Recognize differences between** digital and electronic maps	Submission of laboratory work: work with base map layers Submission of laboratory work: Entering attribute data Performing independent work: professional terminology of digital maps and plans	12
Theme 2. Methods of displaying objects	2/10/10	**Know** the objects used in digital plans and maps **Be able to** form of a set of topographic symbols in ArcGIS-ArcMap and signs for individual thematic layers (including agricultural lands) **Apply** displaying and designing tools **Use** GIS to display objects on digital plans and maps	Submission of laboratory work: Creation of dot symbols of a digital plan Submission Creation of linear conventional signs of a digital plan Submission of laboratory work: Signatures as a component of linear conventional signs of a digital plan Submission of laboratory work: Signatures as a component of polygonal conventional signs of a digital plan Submission of laboratory work: Display of qualitative and quantitative attributes of a digital plan Performing independent work: Peculiarities of the relief image on	35

			digital and electronic maps	
Theme 3. Standardization of geographic information	**2/10/10**	**Know** data formats and be able to use them correctly **Apply** ArcGIS-ArcMap tools for displaying numeric and text data	Submitting of Laboratory work: Creation of localized diagrams Submitting of Laboratory work: Simultaneous display of several attributes of a digital plan Doing independent work: data formats of geoinformation mapping	**23**
Module control			Test	**30**
Total module 1	*6/24/30*			**100**
SEMANTIC MODULE II. TECHNOLOGIES OF DIGITAL MAPPING				
Theme 4. Sources for digital mapping and map design	**2/4/6**	**Know** the sources of information for creating maps **Be able to** create basic cartographic layers **Analyze** sources of information and their quality to create digital maps	Submission of laboratory work: Creation of digital map layers according to the option Submission of laboratory work: Binding of the base of the digital map according to the option Do-It-Yourself: Data Sources for Creating Digital Maps and Plans	**15**
Theme 5. Technology of designing digital maps and plans	**4/6/8**	**Know** the technologies of geographic information mapping **Be able to** model and implement components of geographic information mapping **Highlight** the stages of construction of digital maps and plans **Apply** ArcGIS-ArcMap tools for editing vector data	Submission of laboratory work: Vectorization of point objects of a digital map by option Submission of laboratory work: Vectorization of linear objects of a digital map by option Submission of laboratory work: Vectorization of polygonal objects of a digital map by option	**15**

			Performing independent work: analysis of the use of digital maps and plans in various fields (according to scientific articles and publications)	
Topic 6. Spatial-logical relations of objects	3/4/8	**Know** the spatial and logical relations of objects **Be able** to apply topology rules to verify a digital plan **Apply** ArcGIS-ArcMap tools to identify topology errors	Submission of laboratory work: Verification of topological relations as a means of checking the quality of vectorization. Submission of laboratory work: Editing of a digital map by option Performing independent work: Application of the rules of topological relations	**20**
Theme 6. Classification of electronic map	3/7/8	**Know** the purpose of classifiers and codifiers **Be able to** fill the knowledge base of the digital map **Use** ArcGIS-ArcMap in displaying and designing digital plans	Submission of laboratory work: Filling the knowledge base of the digital map according to the option Submission of laboratory work: Creation of diagrams, reports, digital map objects according to the option Submission of laboratory work: Layout of a digital map according to the option Performing independent work: a knowledge base of digital maps	**20**
Module control			Test	**30**
Total module 2	9/21/30			**100**
Total 6 semester				**70**
Final test			Final test	**30**
Total course				**100**

THE COURSE POLICY

Deadline and rearrangement policy:	Deadlines are defined in e-learn course. Works being submitted after deadlines without a reason are evaluated at a lower grade. Rearrangement of module tests takes place with the permission of the lecturer in case of a specific reasons (for example, illness).
Policy of Academic Plagiarism:	Copying other materials during individual works, tests and final test (including the use of mobile devices) are forbidden. Abstracts must have correct text references to the literature used.
Policy of Attendance:	Attendance of lessons is mandatory. According to objective reasons (for instance, illness, international internship) training can take place individually (in distance form (on-line) by agreement with the dean of the faculty)

STUDENT'S RATING SCALE

Student's rating points	The Ukrainian National Grades	
	exams	final tests
90-100	"Excellent"	passed
74-89	"Good"	
60-73	"Satisfactory"	
0-59	"Unsatisfactory"	fail

RECOMMENDED SOURCES OF INFORMATION

Basic:

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

Addition:

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.