DESCRIPTION OF THE COURSE
«Geoinformatics, Informatics and Programming»

Educational qualification level - Bachelor
Specialty 193 Geodesy and Land management
Educational program «Geodesy and Land Management»
Year of training 1**, Semester** 1 **Form of study** full-time
Number of credits ECTS – 9,0
The language of instruction is Ukrainian

Course lecturer	Drozdivskyi Oleg, PhD, Associate Professor
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Course page in eLearn	**https://elearn.nubip.edu.ua/course/view.php?id=705** **https://elearn.nubip.edu.ua/course/view.php?id=706** **https://elearn.nubip.edu.ua/course/view.php?id=707**

DESCRIPTION OF THE DISCIPLINE

The discipline provides the formation of theoretical knowledge and skills in the use of computer technology by land managers in their practical work. The structure of computers and principles of computer operation, capabilities of operating systems, PC hardware and software, basic techniques of using the MS Office office suite and basics of geoinformatics are considered.

Purpose

"Geoinformatics, Informatics and Programming" is studied for the first three semesters and provides an opportunity to use computer technology by specialists in geodesy and land management in their practical work.

Task

The study of the discipline is the formation of the specialist's awareness of the prospects for the development and further practical use of computer technology, theoretical knowledge and practical skills on the computer in MS WINDOWS, , basic techniques using the Microsoft Office package Office, writing a program using high-level language Python. At the end of the course, study the foundations of geoinformatics, which form students' knowledge related to the study of geospatial as a holistic system of diverse objects with their properties and various ways of visualization.

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:***

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.
GC13. 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:***

SC04. Ability to select and use effective methods, technologies and equipment for professional activities in the field of geodesy and land management.

SC05. Ability to use modern information, technical and technological support to solve complex issues of geodesy and land management.

SC06. 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.

SC07. Ability to collect, update, process, critically evaluate, interpret, store, publish and use geospatial data and metadata on objects of natural and man-made origin.

SC09. Ability to use tools, instruments, equipment, facilities in the performance of geodetic and land management tasks.

SC10. Ability to monitor and evaluate land.

learning results:

LR2. Organize and manage the professional development of individuals and groups.

LR3. Communicate information, ideas, problems, solutions, personal experience and arguments to specialists and non-specialists.

LR4. 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.

LR9. Collect, evaluate, interpret and use geospatial data, metadata on objects of natural and manmade origin, apply statistical methods of their analysis to solve specialized problems in the field of geodesy and land management.

LR10. Select and apply tools, equipment, hardware and software required for remote, terrestrial, field and in-house surveys in the field of geodesy and land management.

LR11. Organize and perform remote, ground, field and camera work in the field of geodesy and land management, prepare the results of the work, prepare relevant reports.

LR15. Develop and make effective decisions on professional activities in the field of geodesy and land management, including under conditions of uncertainty.

COURSE STRUCTURE

Topic	**Hours** (lectures / laboratory / independent)	**Learning outcomes**	**Task**	**Assessment**
Semester 1				
Module1. Information technologies in geodesy and land management				
Theme 1. Theoretical prerequisites for the study of geoinformatics	**2/2/15**	**Know the** prerequisites for the development of computer science as a science and basic techniques in the Windows environment **Apply** practical skills to create, copy, move, delete, restore, search and archive files and documents **Be able to use** different types of cloud environments to store large amounts of information.	Execution of laboratory works, their delivery (including in eLearn); Doing independent work (including in eLearn)	**25**

Theme 2. Modern technical means of working with data	**2/6/0**	**Know** the principles of functional construction of a computer as a technical tool for working with data **Be able to** work with different distance learning systems using a personal computer **Analyze** features computer network hardware	Execution of laboratory works, their delivery (including in eLearn);	**35**
Theme 3. Digital transformation	**2/2/0**	**Know** the basic elements of the operating system interface, as well as features of decision making **Be able to** form the concept of PC software and its structure **Analyze** file and file system, full path to file access **Apply** practical skills in working with anti-virus software	Execution of laboratory works, their delivery (including in eLearn);)	**10**
Modular control				**30**
Total content module 1	**6/10/15**			**100**
Module2. Processing of land management information in word processors				
Theme 4. Use of word processors when performing land management works	**2/6/0**	**Know** the purpose and main tasks of application packages, including Microsoft Office, as well as a text editor Microsoft Word **Be able to** configure the interface and set the parameters of work with Microsoft Word **Apply** practical skills in editing and formatting text in Microsoft Word text editor, as well as entering special characters	Execution of laboratory works, their delivery (including in eLearn);	**20**
Theme 5. Working with tables in text editors	**2/2/0**	**Know** the capabilities of Microsoft Word to create, edit, format tables of different structure **Be able to** create and insert tables into a document, edit and format tables, sort data in tables and perform elementary calculations in them **Highlight** additional features for working with tables: headers, automatically adding captions to the table, creating a list of tables, etc.	Execution of laboratory works, their delivery (including in eLearn);	**15**

Theme 6. Work with graphic objects in text editors	**2/4/0**	**Know** the capabilities of MS Word to create special, templates, flowcharts, charts, graphs and placement of SmartArt graphics in a text editor **Be able to** select, place various layouts of SmartArt graphic objects, edit, format SmartArt graphic objects, in particular, create, edit your own block diagrams **Apply** practical skills in creating templates and forms, as well as links on the page, as well as creating a list of references in a text editor	Execution of laboratory works, their delivery (including in eLearn);	**20**
Theme 7 Work with scientific and technical documentation	**3/8/0**	**Know** the basic ways to create formulas, footers **Be able to** perform simple calculations in tables in the text editor MS Word, as well as edit footers, **Apply** the basic techniques for text review in MS Word	Execution of laboratory works, their delivery (including in eLearn);	**20**
Total content module 2	**9/20/0**			**100**
Total for semester 1				**70**
Test				**30**

II Semester				
Module1 (3). Processing of land management information in table processors				
Theme 1 (8). The use of table processors when performing land management works	**2/6/15**	**Know** the purpose and main tasks of application packages, in particular Microsoft Office, as well as the Microsoft Excel spreadsheet **Apply** practical skills in creating, copying, moving, deleting, restoring, searching, and archiving workbooks. **Be able to** create, edit, format books in the Microsoft Excel spreadsheet	Execution of laboratory works, their delivery (including in eLearn); Doing independent work (including in eLearn)	**25**

Theme 2 (9). Work with formulas and functions in spreadsheet processors	**2/4/0**	**Know** the elements and composition of a formula, absolute and relative references to cells in the Microsoft Excel spreadsheet **Be able to** create and edit formulas in the Microsoft Excel spreadsheet **Analyze** features copying formulas in the Microsoft Excel spreadsheet **Apply** formulas when calculating the monetary value of land plots in the Microsoft Excel spreadsheet	Execution of laboratory works, their delivery	**35**
Theme 3 (10). Visualization of data in the form of diagrams by means of spreadsheet processors	**2/4/0**	**Know** the types of diagrams and the features of their use for visualization of numerical data **Be able to** choose the type and build diagrams in the Microsoft Excel spreadsheet **Analyze** the presentability of the diagram when visualizing numerical data. **Apply** practical skills for working with a diagram in the Microsoft Excel spreadsheet	Execution of laboratory works, their delivery	**10**
Module Control				**30**
Total module1	**6/14/15**			**100**
Module2 (4). Processing of land management information using high-level programming languages				
Theme 4 (11). Modern programming languages. The basic syntax of the Python language	**2/4/0**	**Know** the classification of programming languages, the general structure of a program in the Python programming language **Be able to** create an elementary program in Python using mathematical operators, built-in functions and outputting the result to the console. **Apply** practical Python skills to handle angular and metric measurements.	Execution of laboratory works, their delivery	**15**

Theme 5 (12). The concept of control structures in programming. Functions	**2/4/0**	**Know** the classification of control structures, syntax of cyclic and conditional structure, functions in Python **Be able** to program your own functions in Python, perform cyclic and conditional operations in the program. **Apply** programming to convert degrees of angles to decimal and vice versa, to perform verification of entered variables.	Execution of laboratory works, their delivery Doing independent work (including in eLearn)	**20**
Theme 6 (13). Work with complex data types	**2/4/0**	**Know** the definitions of lists, records, dictionaries, sets in Python **Be able to** choose the type of complex data depending on the task, program input, recording and output of complex data types. **Apply** practical programming skills, using complex data types, when working with large arrays of information	Doing independent work (including in eLearn) **eLearn**)	**20**
Theme 7 (14). Work with files	**3/4/0**	**Know** the classification of files into text and binary, Python syntax when working with files **Be able to** open, write to, close files in a Python program, calculate the program's running time **Apply** programming skills with the output of results to a file when working with large arrays of information.	Execution of laboratory works, their delivery	**15**
Module Control				**30**
Total module2 (4)	**9/16/0**			**100**
Всього за II Semester				**70**
Екзамен				**30**
III Semester				
Module1 (5). Fundamentals of geoinformatics				
Theme 1 (15). From geography to geoinformatics	**2/4/0**	**Know** the prerequisites for the development of geoinformatics as a science and the basic techniques of Google Earth Pro	Execution of laboratory works, their delivery	**15**

		Be able to configure the interface and set parameters for working with the Google Eatrh Pro program **Apply** practical skills in working with software tools		
Theme 2 (16). Basics of spatial thinking.	**2/4/15**	**Know** the basics of spatial thinking **Be able to** search and organize the results of the search for geographic objects using Google Earth Pro **Apply** geometric primitives for the presentation of objects and their display styles	Execution of laboratory works, their delivery Doing independent work (including in eLearn)	**25**
Theme 3 (17). Domains of geographic information	**2/6/0**	**Know** the domains of geographic information **Be able to** work with 4D data in Google Earth Pro **Apply** practical skills to carry out cartometric operations in Google Earth Pro	Execution of laboratory works, their delivery	**30**
Module Control				**30**
Total module1 (5)	**6/14/15**			**100**
Module2 (6). Modeling of geographic objects in geoinformatics				
Theme 4 (18). Geographical fields and objects as the main entities of geographical space	**2/4/0**	**Know** the essence of definitions of geographic fields and geographic objects **Be able to** configure the interface and set parameters for working with the QGIS program **Apply** practical skills in working with layers in QGIS	Execution of laboratory works, their delivery	**15**
Theme 5 (19). Vector and object models of spatial data	**2/4/0**	**Know** the advantages and disadvantages of representing spatial data through vector data models **Be able to** get information about layer objects	Execution of laboratory works, their delivery	**20**
Theme 6 (20). Mosaic models of spatial data	**2/4/0**	**Know** the advantages and disadvantages of representing spatial data through mosaic data models **Be able to** search for objects by attribute data	Doing independent work (including in eLearn) **eLearn**)	**20**

		To establish practical skills in performing cartometric operations		
Theme 7 (21). From geoinformatics to GIS and databases	**3/4/0**	**Know** the basic concepts of geospatial information and its presentation and GIS **Be able to** develop simple layouts **Apply** basic techniques for processing spatial data	Doing independent work (including in eLearn) **eLearn**)	**15**
Module Control				**30**
Total module2 (6)	**9/20/0**			**100**
Всього за III Semester				**70**
Екзамен				**30**

EVALUATION POLICY

Deadline and recompilation policy:	Deadlines are defined in the ЕНК. Works that are rented out violation of deadlines without good reason, are assessed on lower score. Models are rearranged with permission lecturer if there are good reasons (for example, hospital).
Academic Integrity Policy:	Write-off during independent work, testing and credit prohibited (including the use of mobile devices). Abstracts must have correct textual references to the literature used
Visiting Policy:	Attendance is mandatory. For objective reasons (eg illness, international internship) training can to take place individually (in remote on-line form for in agreement with the dean of the faculty)

STUDENT EVALUATION SCALE

Rating of higher education seekers, points	**National assessment for the results of examinations**	
	exam	**test**
90-100	excellent	credited
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	not credited

RECOMMENDED SOURCES OF INFORMATION

1. Конспект лекцій з дисципліни «Геоінформатика». Частина 1 (для студентів напрямку підготовки «Геодезія, картографія та землеустрій») / О.М. Шикула, І.М. Шквир, А.А. Москаленко,Т.А. Гезь. – Київ, 2015. – 241 с.
2. Конспект лекцій з дисципліни «Геоінформатика». Частина ІІ (для студентів напрямку підготовки «Геодезія, картографія та землеустрій») / О.М. Шикула, І.М. Шквир, А.А. Москаленко. – Київ, 2015. – 305 с.
3. Конспект лекцій з дисципліни «Геоінформатика». Частина ІІІ (для студентів напрямку підготовки «Геодезія, картографія та землеустрій») / О.М. Шикула, О.П. Дроздівський, І.М. Шквир, А.А. Москаленко. – Київ, 2015. – 162 с.
4. Курс лекцій з дисципліни «Інформатика і програмування» (для студентів напрямку підготовки «Геодезія, картографія та землеустрій» скорочений термін навчання) /

О.М. Шикула, І.М. Шквир, А.А. Москаленко,Т.А. Гезь, Н.М. Назаренко. – Київ, 2014. – 128 с.

5. Методичні вказівки до виконання самостійної роботи з дисципліни «Інформатика і програмування» (для студентів напрямку підготовки «Геодезія, картографія та землеустрій» скорочений термін навчання) / О.М. Шикула, І.М. Шквир. – Київ, 2013. – 16 с.

6. Методичні вказівки до виконання самостійної роботи з дисципліни «Інформатика і програмування» (для студентів напрямку підготовки «Геодезія, картографія та землеустрій») / О.М. Шикула, І.М. Шквир. – Київ, 2013. – 32 с.

7. Bolstad P., Manson S. GIS Fundamentals: A First Text on Geographic Information System. 7th Edition. 2022. 764 p.

8. Павлиш В. А., Гліненко Л. К., Шаховська Н. Б.. Основи інформаційних технологій і систем. Львів: Львівська політехніка. 2018. 620с.

9. 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.

10. Alexander M., Kusleika D. Microsoft Excel 365 Bible. Wiley 2022. 1072 p.

11. Еллен Лаптон, Дженніфер Коул Філліпс. Графічний дизайн. Нові основи. Київ: ArtHuss. 2019. 262 с.

12. Берінато С. Хороші діаграми. Поради, інструменти та вправи для кращої візуалізації даних. Київ: ArtHuss. 2022. 288 с.

13. Пол Беррі. Head First. Python: Легкий для сприйняття довідник. Харків: 2021. 624 с.

14. Шипулін В. Д. Основні принципи геоінформаційних систем: навчальний посібник. Харків: ХНАМГ, 2010. 313 с.

15. Електронний навчальний курс URL: http://elearn.nubip.edu.ua/course/view.php?id=705

16. Електронний навчальний курс URL: http://elearn.nubip.edu.ua/course/view.php?id=706

17. Електронний навчальний курс URL: http://elearn.nubip.edu.ua/course/view.php?id=707

18. Електронний навчальний курс URL: http://elearn.nubip.edu.ua/course/view.php?id=2436

19. Електронний навчальний курс URL: http://elearn.nubip.edu.ua/course/view.php?id=2437

20. Електронний навчальний курс URL: http://elearn.nubip.edu.ua/course/view.php?id=2438

21. Moodle Documentation. URL: https://docs.moodle.org/403/en/Main_page

22. Word help & learning. URL: https://support.microsoft.com/en-us/word

23. Excel help & learning. URL: https://support.microsoft.com/en-us/excel

24. Довідник з мови Python. URL: https://docs.python.org/uk/3/reference/index.html

25. Online IDE - Code Editor, Compiler, Interpreter. URL: https://www.online-ide.com/

26. Google Earth Help. URL: https://support.google.com/earth/?hl=en#topic=7364880

27. QGIS User Guide. URL: https://docs.qgis.org/3.28/en/docs/user_manual/index.html