

**Syllabus
selective component of VC**

GIS in land resources management

Discipline name:	GIS in land resources management
Level of higher education:	First (undergraduate)
Course page in Moodle:	https://dl2022.khadi.kharkov.ua/course/view.php?id=2581
The volume of the educational component	4 credits (120 hours)
Form of final control	Test
Consultations:	on schedule
Name of the department:	Department of Road Design, Geodesy and Land Management
Language of instruction:	English
Course leader:	Lyudmila Mykhaylivna Kazachenko, Ph.D., associate professor
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Brief content of the educational component:

The goal is the formation of theoretical knowledge and practical skills for a holistic understanding of the general tasks of GIS systems in the tasks of land management at the state level as a science and the possibility of using the scientific foundations of the discipline in practical activities in the field of geodesy and cartography and land management.

Subject: creation of modern software products for managing land resources makes it possible to provide an information database of the State Land Cadastre and its administration.

The main tasks of studying an academic discipline are:

master the knowledge of GIS technologies for the land resource management system in the State Land Cadastre.

Prerequisites for studying the educational component:

Geodesy; Higher mathematics; Land management

Competencies acquired by the acquirer:

Special (professional) competences:

The ability to apply fundamental knowledge to analyze phenomena of natural and man-made origin when performing professional tasks in the field of geodesy and land management.

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

Ability to apply regulatory and legal acts, regulatory and technical documents, reference materials in professional activities.

The ability to choose and use effective methods, technologies and equipment for carrying out professional activities in the field of geodesy and land management.

Learning outcomes:

Know and apply in professional activity regulatory and legal acts, regulatory and technical documents, reference materials in the field of geodesy and land management and related fields.

Collect, evaluate, interpret and use geospatial data, metadata about 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.

Apply conceptual knowledge regarding the creation and functioning of a geoinformation system, types of software products in land management.

Thematic plan

Topic number	Title of topics (LK, LR, PR, SZ, SR)	Number of hours	
		Full-Time	Correspondence
1	2	3	4
Chapter 1. Subject and tasks of the discipline "GIS technologies"			
1	LK.Subject and tasks of the course "GIS in land resources management". Connection of the course with other disciplines.	2	1
	PR. GIS systems and information processing tools.	2	1
	SR. Study of topic material 1. History of GIS formation	6	12
2	LK.Geoinformation systems. History of GIS development in the field of geodesy, land management and state land cadastre.	2	–
	SR. Study of topic material 1. Global trends in GIS development	4	–
3	LK.GIS systems and land management, database of the State Land Cadastre of Ukraine.	2	1
	PR. Information layers of the Public Cadastral Map of Ukraine.	2	1
	SR. Study of topic 2. Development of GIS in Ukraine	6	12
4	LK.Public cadastral map of Ukraine. Methods of filling it with data and structuring with information layers.	2	–
	SR. Studying the material of topic 2. Formation of databases	4	–
5	LK. Software for processing the results of geodetic measurements and purposes of geodesy and land management.	2	1
	PR. GIS technologies for processing the results of the geodetic survey of the territory and the development of land management documentation in the management of land resources	2	1
	SR. Studying the material of topic 3. Studying software on a computer	5	12
6	LK. Types of software products in land management. Types of processing. DBMS	2	–
	SR. Studying the material of topic 3. Database management	4	–
7	LK.The database of the State Land Cadastre	2	1
	PR.GIS technologies for processing the results of geodetic measurements and filling the database of the State Land Cadastre..	2	1

	SR. Studying the material of topic 4. Integration of databases	5	12
8	LK.Information resources of the land management system.	2	–
	SR. Studying the material of topic 4. The territorial development system of Europe 2000+	4	–
9	LC of the State Land Cadastre database server for land management purposes.	2	1
	PR Access to servers. Access key. The key to the recalculation of the land management system.	2	–
	SR. Studying the material of topic 5. The system of conducting DZK	6	15
10	LK Filling information layers of DZK in a single GIS system.	2	–
	SR. Studying the material of topic 5. European integration trends in the formation of land information databases	4	–
11	LK.State register of the database of the State Land Cadastre.	2	1
	PR.Entering information into the database of the State Land Cadastre using GIS technologies.	2	–
	SR. Studying the material of topic 6.XML exchange file.	5	15
12	LK.State cadastral registrar..	2	–
	SR. Studying the material of topic 6.Powers and rights of the registrar in the management of land resources	4	–
13	LK.Operational systems of land resource management.	2	–
	PR. Obtaining initial information from operational systems. Use of GIS technologies and software products	2	–
	SR Provision of land information services	5	16
14	LK.Formation of GIS for the territorial community	2	–
	SR.Selection of software for GIS development	4	–
15	LK Remote sensing of the Earth and the use of GIS systems in the management of land resources.	2	–
	PZ Software and software products for land management.	2	–
	SR. Studying the material of topic 8. Involvement of the public in the filling of GIS	4	16
16	LK The latest geodetic devices and software products for processing the results of geodetic measurements and construction of planning and cartographic materials.	2	–
	SR. Planning and cartographic materials for the formation of GIS	4	–
In just one semester		120	120
ALL by discipline		120	120

Teaching methods:

verbal (lecture, explanation, story, conversation, discussion, work with a book), visual (the method of illustrations and demonstrations), practical tasks and independent work of the acquirer.

Grading system and requirements:

Current success

1 The current success of applicants for the performance of educational types of work in training sessions and for the performance of tasks of independent work is assessed using a four-point scale of grades, followed by recalculation into a 100-point scale. During the assessment of current performance, all types of work provided for by the curriculum are taken into account.

1.1 Lectures are evaluated by determining the quality of the specified tasks.

1.2 Practical classes are assessed by the quality of the control or individual task, the performance and design of practical work.

1.3 Laboratory classes are assessed by the quality of the implementation of reports on the performance of laboratory work.

1.4 Seminars are evaluated by the quality of the individual task / abstract.

2 Evaluation of the current performance of applicants for higher education is carried out at each practical lesson (laboratory or seminar) on a four-point scale ("5", "4", "C", "2") and recorded in the journal of accounting for academic performance.

– "excellent": the applicant perfectly mastered the theoretical material, demonstrates deep knowledge of the relevant topic or academic discipline, the main provisions;

– "good": the applicant has well mastered the theoretical material, owns the main aspects from primary sources and recommended literature, reasonably teaches it; has practical skills, expresses his reasoning about certain problems, but assumes certain inaccuracies and errors in the logic of presenting theoretical content or in the analysis of practical;

– "satisfactory": the applicant has mainly mastered the theoretical knowledge of an academic topic or discipline, is oriented in primary sources and recommended literature, but unconvincingly answers, confuses concepts, uncertainly answers additional questions, does not have stable knowledge; answering questions of a practical nature, reveals inaccuracies in knowledge, does not know how to evaluate facts and phenomena, connect them with a future profession;

– "unsatisfactory": the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, is almost not oriented in primary sources and recommended literature, there is no scientific thinking, practical skills are not formed.

3 The final score for current activities is recognized as the arithmetic average sum of points for each lesson, for individual work, current tests according to the formula:

$$K^{nomou} = \frac{K1 + K2 + \dots + Kn}{n},$$

where K^{nomou} – is the final assessment of success based on the results of current control;

$K1, K2, \dots, Kn$ – assessment of the success of the measure of current control;

n – the number of measures of current control.

Scores are converted to points according to the recalculation scale (Table 1).

Table 1 – Recalculation of the average score for current activities into a multi-point scale

4-point Scale	100-point Scale	4-point Scale	100-point Scale	4-point Scale	100-point Scale	4-point Scale	100-point Scale
<u>5</u>	<u>100</u>	<u>4,45</u>	<u>89</u>	<u>3,90</u>	<u>78</u>	<u>3,35</u>	<u>67</u>
<u>4,95</u>	<u>99</u>	<u>4,4</u>	<u>88</u>	<u>3,85</u>	<u>77</u>	<u>3,3</u>	<u>66</u>
<u>4,9</u>	<u>98</u>	<u>4,35</u>	<u>87</u>	<u>3,80</u>	<u>76</u>	<u>3,25</u>	<u>65</u>
<u>4,85</u>	<u>97</u>	<u>4,3</u>	<u>86</u>	<u>3,75</u>	<u>75</u>	<u>3,2</u>	<u>64</u>
<u>4,8</u>	<u>96</u>	<u>4,25</u>	<u>85</u>	<u>3,7</u>	<u>74</u>	<u>3,15</u>	<u>63</u>
<u>4,75</u>	<u>95</u>	<u>4,20</u>	<u>84</u>	<u>3,65</u>	<u>73</u>	<u>3,1</u>	<u>62</u>
<u>4,7</u>	<u>94</u>	<u>4,15</u>	<u>83</u>	<u>3,60</u>	<u>72</u>	<u>3,05</u>	<u>61</u>

<u>4,65</u>	<u>93</u>	<u>4,10</u>	<u>82</u>	<u>3,55</u>	<u>71</u>	<u>3</u>	<u>60</u>
<u>4,6</u>	<u>92</u>	<u>4,05</u>	<u>81</u>	<u>3,5</u>	<u>70</u>	from 1,78 to 2,99	from 35 to 59
						Reassembly	
<u>4,55</u>	<u>91</u>	<u>4,00</u>	<u>80</u>	<u>3,45</u>	<u>69</u>	from 0 to 1,77	from 0 to 34
<u>4,5</u>	<u>90</u>	<u>3,95</u>	<u>79</u>	<u>3,4</u>	<u>68</u>	Re-study	

Final assessment

1 The applicant for higher education receives credit at the last lesson in the discipline based on the results of the current assessment. The average score for current activities is converted into points on a 100-point scale, according to the recalculation table (Table 1). Applicants for higher education who have an average current grade in a discipline lower than "3" (60 points) in the last lesson can increase their current score by passing tests in the discipline.

Assessment of knowledge of applicants by testing is carried out on a scale:

- "Excellent": at least 90% of correct answers;
- "Very good": from 82% to 89% of correct answers;
- "Good": from 74% to 81% of correct answers;
- "Satisfactory": from 67% to 73% of correct answers;
- "Satisfactory enough": from 60% to 66% of correct answers;
- "Unsatisfactory": less than 60% of correct answers.

2 The condition for obtaining the test is:

- working out all missed classes;
- the average current score in the discipline is not lower than "3" (60 points).

3 For the implementation of individual independent work and participation in scientific events, applicants are awarded additional points.

3.1 Additional points are added to the sum of points scored by the higher education student for current academic activities (for disciplines for which the test is the final form of control), or to the final grade in the discipline for which the exam is the final form of control.

3.2 The number of additional points awarded for different types of individual tasks depends on their volume and significance:

- prizes in the discipline at the international / all-Ukrainian competition of scientific student works – 20 points;
- prizes in the discipline at the All-Ukrainian Olympiads – 20 points;
- participation in the international / all-Ukrainian competition of scientific student works – 15 points
- participation in international / all-Ukrainian scientific conferences of students and young scientists – 12 points;
- participation in all-Ukrainian olympiads in the discipline – 10 points
- participation in olympiads and scientific conferences of KhNADU in the discipline – 5 points;
- implementation of individual research (educational and research) tasks of increased complexity – 5 points.

3.3 The number of additional points may not exceed 20 points.

4 The result of training is evaluated (*choose the right one*):

- on a two-point scale (credited/not credited) according to table 2;
- on a 100-point scale (for differentiated standings) according to Table 3.

The final score, together with additional points, cannot exceed 100 points.

Table 2 – Scale of transfer of points to the national grading system

On a 100-point scale	On a national scale
from 60 points to 100 points	enrolled
less than 60 points	unaccounted for

Table 3 – Scale of assessment of applicants' knowledge based on the results of the final control in the discipline

Score in points	National scale score		ECTS score	
	Exam	Passed	Score	Criteria
90-100	Perfectly	Enrolled	A	The theoretical content of the course is mastered entirely, without gaps, the necessary practical skills of working with the mastered material are formed, all the training tasks provided by the training program have been completed, the quality of their implementation is estimated by the number of points close to the maximum
80-89	Well	Enrolled	B	The theoretical content of the course is mastered entirely, without gaps, the necessary practical skills in working with the mastered material are mainly formed, all the training tasks provided by the training program have been completed, the quality of most of them is estimated by the number of points close to the maximum
75-79			C	The theoretical content of the course is mastered entirely, without gaps, some practical skills of working with the mastered material are not sufficiently formed, all the training tasks provided by the training program have been completed, the quality of none of them is assessed by the minimum number of points, some types of tasks are performed with errors
67-74	Satisfactory		D	The theoretical content of the course is partially mastered, but the gaps are not significant, the necessary practical skills in working with the mastered material are mainly formed, most of the training tasks provided by the training program have been completed, some of the tasks performed may contain errors

60–66			E	The theoretical content of the course is partially mastered, some practical skills of work are not formed, many of the training tasks provided by the training program have not been completed, or the quality of some of them is estimated by the number of points close to the minimum.
35–59	Disappointing	Not credited	FX	The theoretical content of the course is partially mastered, the necessary practical skills of work are not formed, most of the provided training programs have not been completed, or the quality of their implementation is estimated by the number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the training tasks (with the possibility of re-compilation)
0–34	Unacceptable		F	The theoretical content of the course has not been mastered, the necessary practical skills of work are not formed, all completed training tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the training tasks (with a mandatory repeated course)

Course Policy:

- the course involves teamwork, the environment in the audience is friendly, creative, open to constructive criticism;
- mastering the discipline involves the obligatory attendance of lectures and practical classes, as well as independent work;
- independent work involves the study of individual topics of the discipline, which are made in accordance with the program for independent study, or were considered briefly;
- all tasks envisaged by the program must be completed within the prescribed period;
- if the applicant for higher education is absent from the classroom for a good reason, he presents the completed tasks during the independent preparation and consultation of the teacher;
- while studying the course, applicants for higher education must comply with the rules of academic integrity set forth in the following documents: "Rules of academic integrity of participants in the educational process of KhNADU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), "Academic integrity. Verification of the text of academic, scientific and qualification works for plagiarism" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), "Moral and ethical code of participants in the educational process of KhNADU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).
- in case of detection of the fact of plagiarism, the applicant receives 0 points for the task and must re-complete the tasks provided for in the syllabus;
- write-offs during tests and exams are prohibited (including using mobile devices). Mobile devices are only allowed to be used during online testing.

Recommended Books:

1. Tevyashev A.D., Tkachenko V.P., Guba M.I., Manakova N.O. Geoinformation systems: training. manual. Kharkiv: "Oberig" LLC, 2014. 272 p.
2. Andreychuk Yu.M., Yamelynets T.S. GIS in environmental research and environmental protection. Lviv: Prostir-M, 2015. 285 p.
3. Shipulin V.D. Basics of GIS analysis. Tutorial. Kh.: Hark. national city university farm named after O. M. Beketova, 2014. 330 p.
4. Shipulin V.D. Basics of GIS analysis: Training manual / V. D. Shipulin: Khark. national Acad. urban farm Kh.: KhNAMG, 2012, 300 p.
5. Getting to Know ArcGIS Desktop, fifth edition (2018) / by Michael Law, Amy Collins. Paperback and Electronic: 768 p.
6. Samoilenko VM GIS designing: Textbook (in English and Ukrainian) /VM Samoilenko, LM Datsenko, IO Dibrova. Kyiv: SE 'Print Service', 2015. 256 p.
7. Understanding GIS, fourth edition (2018) / by David Smith, Nathan Strout, Christian Harder, Steven Moore, Tim Ormsby, Thomas Balstrøm. Paperback and Electronic: 414 p.y
8. Tretyak A.M. Land management and land registration in Ukraine. K., 1998. 224 p.
9. Kazachenko L.M., Kazachenko D.A GIS technologies and consistency of the cadastre system in the administration of eco-network objects / Kazachenko L.M., Kazachenko D.A // Bulletin of the Kharkiv National Automobile and Road University scientific and technical collection. Kharkiv, 2021. Volume 2 Issue. 92. P. 103–109.
10. Sokhnych A., Kazachenko L. Management of land resources: land use and land monitoring. Lviv: PP "Aral", 2020. 44 p.
11. Kazachenko L.M. Use of GIS technologies to establish objects of the nature reserve fund. Innovative technologies in the field of geodesy, land management and design: a collective monograph. Kharkiv: HNADU. 2021. P. 186–218.
12. Kazachenko L.M. Methodical instructions for practical classes and independent work in the discipline "GIS in land resource management" specialty 193 "Geodesy and land management" / L.M. Kazachenko, L.O. Kovalenko, T.I. Tymoshevska, I.V. Musienko. Kharkiv: Khnadu, 2022. 92 p.

Additional sources:

1. distance course:
<https://dl2022.khadi.kharkov.ua/course/view.php?id=2581>
2. Public cadastral map of Ukraine: [Electronic resource]. – Access mode:
<http://map.land.gov.ua/kadastrova-karta>
3. <http://files.khadi.kharkov.ua>
4. <http://www.nbvv.gov.ua>
5. <http://korolenko.kharkov.com>
6. <http://library.univer.kharkov.ua>
7. <https://zakon.rada.gov.ua>

Developer (developers)
syllabus of the discipline

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