Syllabus selective component of VC

Determination of geometric parameters of linear structures

Discipline name:	Determination of geometric parameters of linear structures
Level of higher education:	First (undergraduate)
Course page in Moodle:	https://dl2022.khadi.kharkov.ua/course/view.php?id=2578
The volume of the educational	A gradite (120 bours)
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:	Nataliya Oleksandrivna Arsenyeva, Candidate of
	Technical Sciences, Associate Professor
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Brief content of the educational component:

The goal isformation of theoretical knowledge about the principles and methods of instrumental determination of geometric parameters of existing linear structures.

Subject: methodological foundations and toolkit of engineering and geodetic works during research, design and construction of highways, a systematic approach to project activities in the field of transport construction, analysis and justification of decisions made in the projects of transport facilities.

The main tasks of studying an academic discipline are:

- formation of theoretical knowledge about the principles, technology of engineering and geodetic works during the search, design and construction of highways;

- preparation of students as future specialists in the field of transport construction for a competent, creative solution to issues of design preparation of construction, the role of engineering research in the general complex of transport construction.

Prerequisites for studying the educational component:

Geodesy; Higher mathematics; Informatics; OK 1.05. Engineering and computer graphics.

Competencies acquired by the acquirer:

General competences:

Ability to apply knowledge in practical situations.

Special (professional) competences:

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 use modern information, technical and technological support to solve complex issues 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.

To carry out surveys and search, topographic-geodetic, cartographic, project and project-search works when performing professional tasks in geodesy and land management.

Apply conceptual knowledge of tracing and detailed marking of the highway route, geometric elements of the circular curve, designing the project line of the longitudinal profile of the highway.

Topic		Number of hours		
number	Title of topics (LK, LR, PR, SZ, SR)	Full- Time	Correspondence	
1	2	3	4	
	LK Engineering and geodetic works during searches, design and construction of highways	2	2	
1	PR	-	-	
	SR Studying the material of the topic 1. Normative requirements for the performance of engineering and geodetic works	3	5	
	LK Searching and detailed marking of the road route. Road route, its geometric elements. Assignment of the initial direction of the track.	2	-	
2	PR Calculation of the picket positions of the track points. Knowledge of straight lines, curves and turning angles	2	2	
	SR Studying the material of topic 2. Geometric elements of a circular curve.	3	5	
	LK Detailed route marking. Construction of the track plan.	2	-	
З	PR Determination of the positions of zero work points	2	-	
	SR Studying the material of topic 3. The method of controlling the setting of the directions of the track lines.	3	5	
	LK Construction of longitudinal and transverse profiles of the road	2	-	
4	PR	-	-	
	SR Studying the material of topic 4. Linking the track to the benchmarks of the leveling network	3	5	
	LK Designing the project line of the longitudinal profile of the road	2	-	
5	PR Determination of the height of the suspension above the power line	2	-	
	SR Studying the material of topic 5. Normative requirements for designing the longitudinal profile of the road	5	8	
	LK Peculiarities of engineering and geodetic works during the construction of highways	2	-	
6	PR	-	-	
	SR Studying the material of topic 6. Modern technologies of engineering and geodetic works	5	8	
7	LK Rendering in nature of the design line of the longitudinal profile of the road.	2	2	
	PR Detailed marking of a circular curve by the method of angles and chords and the method of extended chords	2	-	
	SR Studying the material of topic 7. Control points when designing a longitudinal profile	5	5	
8	LK Marking and rendering in nature of the transverse profile of the earth bed in the embankment, recess.	2	-	

Thematic plan

	DD	_	_
	FN OD Oteste is a the sectorial of tenia O. Ferraria size actions the	-	-
	SR Studying the material of topic 8. Exposing in nature the	5	8
	transverse profile of the earth bed on a slope.	•	•
	LC Detailed marking of horizontal curves on highways. Carrying		
	out pickets on the curve. Marking of transverse profiles of the	2	-
	track on the curves	_	
0	DD Detailed marking of roundings with transitional our van by the		
9	PR Detailed marking of roundings with transitional curves by the	2	-
	method of rectangular coordinates from tangents and tangents		
	SR Studying the material of topic 9. Peculiarities of transition	5	o
	curves	5	0
	I.C. Detailed marking of rounding with transition curves. Detailed		
	marking of the rounding with an inaccessible top of the turn	2	
	inarking of the treat.	Z	-
10	angle of the track.		
10	PR	-	-
	SR Studying the material of topic 10. Normative requirements for	L	0
	the design of transitional curves	5	8
	LK Geometric elements of vertical curves. Output data for		
	LA Geometric elements of ventical curves. Output data for	2	-
	detailed marking of vertical curves.		
11	PR Detailed marking of roundings with transition curves by the	2	2
	method of angles and chords	2	2
	SR Studving the material of topic 11. Designation of radii of	_	_
	vortical curves	5	8
	ventical curves		
	LC Detailed marking of vertical curves. Detailed marking of a	2	-
	vertical curve combined with a horizontal rounding.	4	
12	PR	-	-
	SR Studving the material of topic 12. Modern technologies of	_	_
	designing a longitudinal profile	5	8
	LK Virgibi on the roundeboute of highways. New models of hand		
	LK Virajni on the roundabouts of highways. New models of bend	2	-
	structures.		
10	PR Calculation of initial data for detailed marking of vertical	2	
13	curves	2	-
	SR Studying the material of topic 13 Peculiarities of the use of		
	bands on the road	5	8
	LK Marking and vertical planning of hands on highway		
	LK Marking and vertical planning of bends on highway	-	
	roundabouts. Design, marking and vertical planning of bends on	2	-
4.4	curves combined with vertical curves.		
14	PR	-	-
	SR Studying the material of topic 14. Transverse profiles of a		_
	road on a curve	5	8
	I K Engineering and geodetic works during the record works		
	LK Engineering and geodetic works during the reconstruction	2	-
	and repair of highways	-	
15	PR Calculation of data for marking and vertical planning of a	0	
	bend	2	-
	SR Study of topic material 15. Peculiarities of geodetic marking		
	worke during road reconstruction	5	8
		~	
	LK Engineering and geodetic works during road certification	2	-
16	PR	-	-
01	SR Studying the material of topic 16. Modern technologies used	-	0
	in the certification of roads	5	8
In just (nne semester	120	120
	dissiplins	120	120
ALL DY	aiscipline	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:

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

where K^{nomov} – 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
5	<u>100</u>	4,45	<u>89</u>	3,90	78	<u>3,35</u>	<u>67</u>
4,95	<u>99</u>	4,4	<u>88</u>	<u>3,85</u>	77	<u>3,3</u>	<u>66</u>
4,9	<u>98</u>	4,35	<u>87</u>	<u>3,80</u>	<u>76</u>	<u>3,25</u>	<u>65</u>
4,85	<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>
4,75	<u>95</u>	4,20	<u>84</u>	<u>3,65</u>	<u>73</u>	<u>3,1</u>	<u>62</u>
4,7	94	<u>4,15</u>	83	<u>3,60</u>	72	3,05	<u>61</u>
4,65	<u>93</u>	<u>4,10</u>	<u>82</u>	<u>3,55</u>	<u>71</u>	<u>3</u>	<u>60</u>
4,6	<u>92</u>	4,05	<u>81</u>	<u>3,5</u>	<u>70</u>	from 1,78 to	from 35 to
						2,99	59
						Reasser	nbly
<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
4,5	<u>90</u>	3,95	<u>79</u>	<u>3,4</u>	<u>68</u>	Re-stu	dy

Final assessment

1 The applicant for higher education receives credit at the last lesson in he 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 National scale score		ECTS score		
in points	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	lled		В	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	Ň	Enro	С	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	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	Not	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 KhNADU" participants in the educational process of (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.p df), "Academic integrity. Verification of the text of academic, scientific and gualification plagiarism" works for

(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 (<u>https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf</u>). – 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. Kuzmin V.I., Bilyatinsky O.A. Engineering geodesy in road construction: Study guide. K.: Higher School, 2006. 278 p.

2. A.G. Batrakova, V.I. Kuzmin, Dorozhko E.V., Batrakov D.O. Engineering and geodetic monitoring and control in construction. Part II Geodetic works during the construction of tunnels: training. manual. Kharkiv: Khnadu Publishing House, 2020. 144 p.

3. Batrakova A.G. Engineering and geodetic monitoring and control in construction. Part I. Geodetic work during the construction of bridges: teaching. manual./ A.G. Batrakova, V.I. Kuzmin. Kharkiv: Khnadu Publishing House, 2018. 121 p.

4. Batrakova A.G., Dorozhko E.V., Zakharova E.V., Klyuka O.M. Analysis and generalization of regulatory support for geodetic support of road construction objects. Communal management of cities: Scientific and technical collection. [Series: Technical sciences]. Kharkiv: KhNUMG, 2021. Volume 4. Issue.. 164. P. 99-103.

5. Arsenyeva N.O. Peculiarities of the use of geoinformation technologies in road certification / N.O. Arsenyeva, V.M. Ryapukhin, G.R. Fomenko, O.S. Synovets. // Scientific notes of the Tavri National University named after V.I. Vernadskyi. Series: Technical sciences. Volume 30 (69). No. 2. 2019. P. 211–215.

6. Arsenyeva N.O. Modern geodetic devices used in the construction, reconstruction and repair works of highways / Arsenyeva N.O., Fomenko G.R. // Scientific notes of the Tavri National University named after V.I. Vernadskyi. Volume 32 (71). No. 2. 2021.

7. Arsenyeva N.O. Methodical instructions for practical classes and independent work in the discipline "Determination of geometric parameters of linear structures" specialty 193 "Geodesy and land management" / N.O. Arsenyeva, L.O. Kovalenko, G.R. Fomenko, E.V. Zakharova. Kharkiv: Khnadu, 2022. 56 p.

Additional sources:

1. distance course:

https://dl2022.khadi.kharkov.ua/course/view.php?id=2578

- 2. http://files.khadi.kharkov.ua
- 3. http://www.nbwv.gov.ua

4. http://korolenko.kharkov.com

5. http://library.univer.kharkov.ua

Developer (developers) syllabus of the discipline

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