

Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Faculty of Engineering and Technology
Department of Technical Systems Design

Syllabus of the educational component

OK 7 Descriptive geometry and engineering graphics

(mandatory)

Implemented within the educational program

Agricultural engineering

(name)

in the specialty **H7 " Agroengineering "**

(code, name)

at the first (bachelor's) level of higher education

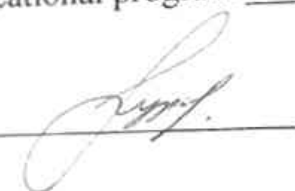
Developer: 


Alla REBRII, senior lecturer
Vladyslav ANDRUSYAK, assistant

Considered, approved and ratified at a meeting of the Department of Technical Systems Design (name of the department)	minutes of <u>03.06.2026</u> No. <u>14</u>
	Manager Department <u></u> Oleksandr IVCHENKO

Agreed:

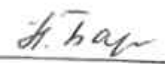
Guarantor of the educational program  Bohdan SARZHANOV

Dean of the Faculty  Svitlana KHURSENKO

A review of the work program (attached) was
provided by:

 Bohdan SARZHANOV

 Oleksandr IVCHENKO

Methodist V.Y.O.L.A  N. Baranik

Registered in the electronic database: date: 16.06. 2026.

Information on reviewing the work program (syllabus):

Academic year in which changes are made	Number of the appendix to the work program with a description of the changes	Changes reviewed and approved		
		Date and number of the minutes of the department meeting	Head of the Department	Educational program guarantor

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	Name OK	OK7 Descriptive geometry and engineering graphics							
2.	Faculty/department	Faculty of Engineering and Technology / Department of Technical Systems Design							
3.	Status OK	Mandatory							
4.	Program/Specialty (programs), part of which is the OK for (<i>filled in for mandatory OKs</i>)	Agricultural Engineering / H7 Agricultural Engineering							
5.	NRC level	Level 6							
6.	Semester and duration of study	1 semester, 15 weeks 2nd semester, 15 weeks							
7.	Number of ECTS credits	10.0							
8.	Total hours and their distribution 1 semester – 150 hours, exam 2nd semester – 150 hours, credit 1st year – 300 hours, exam	Contact work (classes)						Independent work	
		Lectures		Practical/seminar		Laboratory			
		Daily	Zaoch	Daily	Correspondence	Daily	Correspondence	Daily	Correspondence
		14	-	-	-	60	-	76	-
		14	-	-	-	60	-	76	-
			10	-	-	-	10	-	280
9.	Language of instruction	Ukrainian							
10.	Teacher/Educational Component Coordinator	Rebriy Alla Nikolaevna, senior lecturer							
10.1	Contact information	Department Auditorium 415m, Faculty of Engineering and Technology, Building No. 4, ralm777.as@gmail.com							
11.	General description of the educational component	This discipline is the basis of graphic literacy, which is of particular importance in modern production. It forms in future specialists deep theoretical and practical knowledge on reading and executing drawings, the ability to analyze geometric shapes, methods of constructing images of spatial forms on a plane and methods of solving geometric problems based on a given image of these forms, develops logical thinking and spatial perception							

		of students. Teaches to use graphic computer programs to perform graphic tasks.
12.	Purpose of the educational component	<i>The purpose of the educational component "Descriptive Geometry and Engineering Graphics" is to develop students' understanding of spatial forms of objects in the surrounding world using graphic methods, study methods of constructing and reading drawings, study state standards, and acquire skills in drawing using drawing tools and computer graphics software.</i>
13.	Prerequisites for studying OK, connection with other educational components of OP	The competencies developed in the educational component are necessary for the formation of higher education students' ability to develop spatial forms of objects in the surrounding world using graphic methods. The educational component is the basis for the educational components: OK 15 Agricultural machinery. OK 17 Machine parts and lifting and handling machines , OK 18 Theory of mechanisms and machines
14.	Academic Integrity Policy	The system of requirements that are placed on a higher education applicant when studying the educational component: - students completing the assessment stages within the established deadlines; - completion and defense of practical and individual work within the established deadlines; - compliance by students with the code of academic integrity of Sumy NAU (https://bit.ly/3xf92wW). Graphic works must be original, completed independently. Works submitted after the deadline without good reason will be evaluated with a lower grade. Works that are a copy of someone else's work will be evaluated with a "zero" with the subsequent performance of the work according to another original individual task. Re-submission of graphic works occurs after repeated performance or revision. Copying from various sources of information (including using mobile devices and gadgets) during exams is prohibited. If the fact of copying is detected, the student's work is canceled and the exam is retaken. Re-taking of the exam or credit is carried out with the permission of the dean's office within the specified terms after re-learning the material from the educational component.
15.	Link to the course in Moodle system	1 semester – https://cdn.snau.edu.ua/moodle/course/view.php?id=2971 2nd semester - https://cdn.snau.edu.ua/moodle/course/view.php?id=3144
16.	Keywords	N aristic geometry; Graphic disciplines; Information technologies; Computer graphics; Computer aided design systems

2. LEARNING OUTCOMES BY EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

Learning outcomes for OK: After studying the educational component, the student is expected to be able to...	Program learning outcomes that the OC aims to achieve (indicate the number according to the numbering given in the OP)				How is RND assessed?
	PRN 1	PRN 7	PRN 13	PRN 1 4	
	Possess humanitarian , natural science and professional knowledge ; formulate ideas and concepts for use in the profession and its activities .	Solve complex engineering and technical problems related to the functioning of agricultural machinery and technological processes of production, storage, processing and transportation of agricultural products.	Describe the structure and explain the principle of operation of agricultural machinery. Select the working parts of the machines according to soil and climatic conditions and the characteristics of agricultural materials.	Reproduce machine parts in graphic form according to system requirements design documentation . Use a measuring instrument to determine the parameters of machine parts .	
DRN 1. Perform drawings in accordance with state standards.	+	+	+	+	Performing and defending laboratory work according to individual assignments. Final computer-based testing is a multiple-choice test.
DRN 2. Possess a set of basic methods of presenting information when performing graphic work.	+	+	+	+	Performing and defending laboratory work according to individual assignments. Final computer-based testing is a multiple-choice test.
DRN 3. Apply modern methods of graphical representation	+	+	+	+	Performing and defending laboratory work according to

of information when performing and designing drawings using an automated design system.					individual assignments. Final computer-based testing is a multiple-choice test.
DRN 4. Solve problems in the design of parts and diagrams using an automated design system .	+	+	+	+	Performing and defending laboratory work according to individual assignments. Final computer-based testing is a multiple-choice test.

3. CONTENT OF THE EDUCATIONAL COMPONENT (COURSE PROGRAM)

1 semester

Topic. List of issues to be addressed within the topic	Distribution within the overall time budget			Recommended reading
	Classroom work full-time/part-time		Independent work full-time/part-time	
	Luke day / extramural	P.z / semin . z	Lab . with. day / extramural	
Topic 1: <i>Introduction. State standards. Types of projection systems. Coordinate method, Monge complex drawing</i> 1. Introduction. The subject of the discipline and its tasks. 2. Types of projection systems. Coordinate method. Octants, a point on a diagram. 3. Basic rules for drawing. Font types. Line types. Scales.	2/1	-/-	8/1	10/20 [1], [2], [3], [4], [6], [8], [15], [16], [17]

4. Geometric drawing. Conjugation. Dividing a circle into equal parts.					
Topic 2: <i>Line. Plane. Position of line and plane relative to projection planes.</i> 1. Lines of general and particular position. 2. Natural value of a line. Angles of inclination to the planes of projections. 3. Traces of a straight line. 4. The relative position of a point and a line. 5. The relative position of two lines. 6. Planes of general and individual position. 7. Traces of the plane.	2/-	-/-	8/-	10/20	[1], [2], [3], [4], [6], [8], [15], [16], [17]
Topic 3: <i>Polyhedra. Section of polyhedra by a plane.</i> 1. Projections of polyhedra (prisms, pyramids). 2. Plane section of a prism. 3. Plane section of a pyramid.	2/1	-/-	8/-	10/20	[1], [2], [3], [4], [6], [8], [15], [16], [17]
Topic 4: <i>Surfaces of revolution. Section of surfaces of revolution by a plane.</i> 1. Projections of surfaces of revolution (cylinder, cone, sphere). 2. Cross-section of a cylinder by a plane. 3. Section of a cone by a plane. 4. Section of a sphere by a plane.	2/1	-/-	10/1	1 0/20	[1], [2], [3], [4], [6], [8], [15], [16], [17]

Topic 5: <i>Axonometric projections. Methods for converting complex drawings.</i> 1. General provisions. Types of axonometric projections. 2. Axonometry of polyhedra. 3. Axonometry of surfaces of revolution. 4. Method of replacing projection planes. 5. Plane-parallel movement. 6. Method of rotation around the axis of a parallel plane of projections. 7. A method of rotation around axes perpendicular to the projection planes. 8. Combination method.	2/1	-/-	8/1	1 2/20	[1], [2], [3], [4], [6], [8], [15], [16], [17]
Topic 6: <i>Surface scans.</i> 1. Prism scan. 2. Pyramid sweep. 3. Cylinder scan. 4. Cone sweep	2/1	-/-	8/1	1 2/20	[1], [2], [3], [4], [6], [8], [15], [16], [17]
Topic 7: <i>Intersection of polyhedra and surfaces of revolution.</i> 1. General provisions. 2. Mutual intersection of polyhedra. 3. Intersection of a polyhedron with a surface of revolution. 4. Mutual intersection of surfaces of revolution.	2/-	-/-	10/1	1 2/20	[1], [2], [3], [4], [6], [8], [15], [16], [17]
Total	14/5		60/5	76 /140	

2nd semester

Topic. List of issues to be addressed within the topic	Distribution within the overall time budget			Recommended reading	
	Classroom work full-time/part-time		Independent work full-time/part- time		
	Luke day / extramural	P.z / semin . z	Lab . with. day / extramural		
Topic 1: <i>Basic provisions of the design documentation system. Drawing design.</i> 1. General provisions. 2. Rules for applying dimensions on drawings. 3. Drawing design. 4. Designations on drawings. 5. Introduction to computer graphics. 6. Toolbars. 7. Setting up panels. 8. Configuring the system and document settings.	2/-	-/-	8/1	10/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]
Topic 2: <i>Projection drawing. Views.</i> 1. Main and additional views. 2. Location of views on drawings. 3. Designing views on drawings.	2/1	-/-	8/1	10/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]
Topic 3: <i>Projection drawing. Sections and cross-sections.</i> 1. Classification of sections and cross-sections, their depiction and designation on drawings. 2. Cross-sections of technical details. 3. Combining part of the view with part of the section.	2/1	-/-	10/1	12/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]

4. Introduction to hatching in sections and cross-sections. 5. Conventions and simplification of technical details.					
Topic 4. <i>Connections and transfers.</i> 1. Threaded and splined connections. 2. Welded joints . 3. Rivet and keyed connections. 4. Glued and soldered joints. 5. Bolted, screw connection. 6. Pin connection.	2/1	-/-	8/1	10/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]
Topic 5. <i>General view drawings. Sketches and working drawings.</i> 1. General view drawing. 2. Conventions and simplification of general view drawings when detailing . 3. Sketch. Requirements, rules for designing sketches. 4. Working drawing. Requirements, rules for drawing up a working drawing.	2/1	-/-	8/-	12/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]
Topic 6: Assembly drawing. Formation of assembly drawings. Specification. 1. Select the number of images. 2. Conventions and simplifications on assembly drawings. 3. Drawing dimensions on assembly drawings. 4. Content and design of assembly drawings. 5. C specification.	2/-	-/-	10/1	12/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]

Topic 7: Kinematic diagrams. 1. General information about the schemes 2. Rules for performing kinematic diagrams. 3. Symbols on kinematic diagrams.	2/1	-/-	8/-	10/20	[1], [2], [3], [4], [5], [7], [15], [16], [17]
Total	14/5	-/-	60/5	76/140	

4. TEACHING AND LEARNING METHODS

DRN	Teaching methods (work that will be carried out by the teacher <u>during classroom lessons</u> , consultations)	Number of hours full-time/part-time	Teaching methods (what types of learning activities should <u>the student perform independently</u>)	Number of hours full-time/part-time
DRN 1	Lecture-presentation with demonstration and use of interactive technologies. Showing examples of solving problems using the interactive method in lectures and practical classes. Laboratory classes with graphic works on individual assignments.	36/5	Studying the supporting lecture notes and working with the book. Studying the material for independent study. Taking notes. Completion of graphic work tasks that were started during the contact lesson. Self-assessment of knowledge.	38/70
DRN 2	Lecture-presentation with demonstration and use of interactive technologies. Showing examples of solving problems using the interactive method in lectures and practical classes. Laboratory classes with graphic works on individual assignments.	36/5	Studying the supporting lecture notes and working with the book. Studying the material for independent study. Taking notes. Completion of graphic work tasks that were started during the contact lesson. Self-assessment of knowledge.	38/70
DRN 3	Lecture-presentation with demonstration and use of interactive	38/5	Studying the supporting lecture notes and working	38/60

	technologies. Showing examples of solving problems using the interactive method in lectures and practical classes. Laboratory classes with graphic works on individual assignments.		with the book. Studying the material for independent study. Taking notes. Completion of graphic work tasks that were started during the contact lesson. Self-assessment of knowledge.	
DRN 4	Lecture-presentation with demonstration and use of interactive technologies. Showing examples of solving problems using the interactive method in lectures and practical classes. Laboratory classes with graphic works on individual assignments.	38/5	Studying the supporting lecture notes and working with the book. Studying the material for independent study. Taking notes. Completion of graphic work tasks that were started during the contact lesson. Self-assessment of knowledge.	38/80

5. EVALUATION BY EDUCATIONAL COMPONENT

5.1. Diagnostic assessment (indicated as needed)

5.2. Summative assessment

5.2.1. To assess the expected learning outcomes, there are

full-time education

1 semester

No.	Summative assessment methods	Points / Weight in the overall score	Date of compilation
1.	Performance, preparation and defense of laboratory work (6 points) and graphic work according to an individual assignment (3 GRs of 8 points each). Final computer-based testing is a multiple-choice test.	<i>30 points / 30%</i>	during the semester 2-8 weeks
2.	Performance, preparation and defense of laboratory work (8 points) and graphic work according to an individual assignment (4 GRs of 8 points each). Final computer-based testing is a multiple-choice test.	<i>40 points / 40%</i>	during the semester Week 9-15

3.	Exam – drawing (graphic task) answer on the ticket.	30 points / 30%	examination session dates
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2nd semester

No.	Summative assessment methods	Points / Weight in the overall score	Date of compilation
1.	Performance, preparation and defense of laboratory work (16 points) and graphic work according to an individual assignment (3 GRs of 8 points each). Final computer-based testing-multiple choice test. Final computer-based testing-multiple choice test	40 points / 40%	during the semester 2-8 weeks
2.	Completion, preparation and defense of laboratory work (20 points) and graphic work according to an individual assignment (5 GRs of 8 points each). Final computer-based testing-multiple choice test. Final computer-based testing-multiple choice test	60 points / 60%	during the semester Week 9-15

Component	Evaluation		
Implementation graphic work	<i>Each completed graphic work is evaluated at 8 points.</i>		
	<i>1- 3 points</i>	<i>4-6 points</i>	<i>7-8 points</i>
	<i>Not fully completed</i>	<i>All task requirements have been met, but there are minor comments regarding the design.</i>	<i>All task requirements have been fully met.</i>

correspondence form of study

No.	Summative assessment methods	Points / Weight in the overall score	Date of compilation
1.	Performing individual work	30 points / 30%	during the session
2.	Intermediate computer-based testing is a multiple-choice test.	40 points / 40%	during the session
3.	Exam – computer-based multiple-choice test	30 points / 30%	examination session dates

5.2.2. Evaluation criteria

full-time education

1 semester

Component	Unsatisfactorily	Satisfactorily	Good	Perfectly
Performance, preparation and defense of laboratory work (6 points) and graphic work according to an individual assignment (3 GRs of 8 points each). Final computer-based testing is a multiple-choice test.	< 18 points	18 - 22 points	22 - 28 points	28- 30 points
	Laboratory requirements not completed. Unfinished graphic works 1-3	Most requirements are met, but some components are missing or insufficiently disclosed. Partially completed graphic works 1-3	All requirements of the task have been met, but there are minor comments regarding the design. Graphic works 1-3 are completed, but there are minor comments regarding the design	All task requirements have been met, and your own solution to the task has been proposed. Graphic works 1-3 are fully completed
Performance, preparation and defense of laboratory work (8 points) and graphic work according to an individual assignment (4 GRs of 8 points each). Final computer-based testing is a multiple-choice test.	< 24 points	24-30 points	30 -35 points	35 -40 points
	Laboratory requirements not completed. Unfinished graphic works 4-7	Most requirements are met, but some components are missing or insufficiently disclosed. Partially completed graphic works 4-7	All task requirements have been met, but there are minor comments regarding the implementation. Graphic works 4-7 are completed, but there are minor comments regarding the design	All requirements for laboratory work have been met , and your own solution to the tasks has been proposed. Graphic works 4-7 are fully completed.
Exam - drawing (graphic task) answer to the ticket	< 18 points	18-22 points	23-26 points	27-30 points
	Task requirements not met	Most requirements are met, but some components are missing or insufficiently disclosed	All task requirements have been met, but there are minor comments regarding the implementation	All task requirements met

2nd semester

Component	Unsatisfactorily	Satisfactorily	Good	Perfectly
Performance, preparation and defense of laboratory work (16 points) and graphic work according to an individual assignment (3 GRs of 8 points each). Final computer-based testing-multiple choice test. Final computer-based testing-multiple choice test	< 20 points <i>Laboratory requirements not completed. Unfinished graphic works 1-3</i>	20 - 24 points <i>Most requirements are met, but some components are missing or insufficiently disclosed. Partially completed graphic works 1-3</i>	25 - 34 points <i>All requirements of the task have been met, but there are minor comments regarding the design. Graphic works 1-3 are completed, but there are minor comments regarding the design</i>	35 - 40 points <i>All task requirements have been met, and your own solution to the task has been proposed. Graphic works 1-3 are fully completed</i>
Completion, preparation and defense of laboratory work (20 points) and graphic work according to an individual assignment (5 GRs of 8 points each). Final computer-based testing-multiple choice test. Final computer-based testing-multiple choice test	< 40 points <i>Laboratory requirements not completed. Unfinished graphic works 4-8</i>	40-50 points <i>laboratory requirements completed, but individual components are missing or insufficiently disclosed. Partially completed graphic works 4-8</i>	50-55 points <i>All laboratory requirements have been met , but there are minor comments . Graphic works 4-8 are completed, but there are minor comments regarding the design</i>	55-60 points <i>All requirements for laboratory work have been met , and your own solution to the tasks has been proposed. Graphic works 4-8 are fully completed.</i>

correspondence form of study

Component	Unsatisfactorily	Satisfactorily	Good	Perfectly
Performing individual work	< 18 points	18-22 points	22-28 points	28-30 points

	<i>Task requirements not met</i>	<i>Most requirements are met, but some components are missing or insufficiently disclosed</i>	<i>All task requirements have been met, but there are minor comments regarding the design.</i>	<i>All task requirements have been met, and your own solution to the task has been proposed.</i>
Intermediate computer-based testing - multiple choice test	<i>< 24 points</i>	<i>24-30 points</i>	<i>30 - 35 points</i>	<i>36 - 40 points</i>
	<i>24 out of 40 correct answers</i>	<i>Correct answers 24 to 30 out of 40</i>	<i>Correct answers 30 to 35 out of 40</i>	<i>Correct answers 40 out of 40</i>
Exam – final testing -multiple choice test	<i>< 18 points</i>	<i>18-22 points</i>	<i>23-26 points</i>	<i>26 -30 points</i>
	<i>Correct answers less than 18 out of 30</i>	<i>Correct answers 18 to 22 out of 30</i>	<i>Correct answers 23 to 26 out of 30</i>	<i>Correct answers 30 out of 30</i>

5.3. Formative assessment:

To assess current progress in learning and understand areas for further improvement,

full-time education

No.	Elements of formative assessment	Date
1	<i>Performing laboratory work according to individual assignments during classes with feedback from the teacher.</i>	within 2-15 weeks
2	<i>Oral feedback from the teacher while working on individual assignments during classroom sessions .</i>	within 2-15 weeks
3	<i>Oral feedback from the teacher and students during the preparation of laboratory work according to the individual assignment .</i>	within 3-15 weeks
4	<i>Oral feedback from the teacher and candidates after the defense practical according to individual task</i>	during the 15th week after protection

correspondence form of study

No.	Elements of formative assessment	Date
1	<i>Performing laboratory work according to individual assignments during classes with feedback from the teacher.</i>	during the session

2	<i>Oral feedback from the teacher while working on individual assignments during classroom sessions .</i>	during the session
3	<i>Oral feedback from the teacher and students during the preparation of individual work.</i>	during the session
4	<i>Oral feedback from the teacher and students after the defense individual work.</i>	during the session

6. LEARNING RESOURCES (LITERATURE)

1. Descriptive geometry and engineering graphics : a manual / Ivchenko O. V., Rebriy A. M., Andrusyak V. O., Kulikov O. A. – SNAU, 230 pp ., 2026.
2. Engineering computer graphics : workshop" - Polishchuk M.M. et al ., 2025 - 122 p.
3. Engineering graphics. / Compiled by: V. I. Kovbashyn , A. I. Pik. - Ternopil: Textbooks and manuals, 2023 - 240 p.
4. Descriptive geometry and basics of computer design . Part 1. Lecture notes for 1st year students of specialty 208 " Agroengineering " full-time and part-time forms of study. Sumy, 2023. p. 49 p.
5. Descriptive geometry and basics of computer design . Part 2. Lecture notes for 1st year students of specialty 208 " Agroengineering " full-time and part-time forms of study. Sumy, 2023. p. 58 p.
6. Descriptive geometry and fundamentals of computer design . Methodological instructions for performing laboratory work Part 1 for 1st year students of specialty 208 " Agroengineering " full-time study. Sumy , 2022 , 84 p.
7. Descriptive geometry and fundamentals of computer design . Methodological instructions for performing laboratory work Part 2 for 1st year students of specialty 208 " Agroengineering " full-time study. Sumy , 2024 , 165 p.
8. Descriptive geometry and the basics of computer design . Methodological guidelines for independent work for 1st year students of specialty 208 " Agroengineering " full-time study. Sumy, 2024, 34 p.
9. Rebriy A.M. The use of modern educational technologies in the study of graphic disciplines / A.M. Rebrii // Materials of the scientific and practical conference of teachers, postgraduates and students of Sumy NAU, April 26-29, 2022: abstracts supplement - Sumy: SNAU, 2022. – P.113
10. Rebrii A.M. Using online tools in the educational process / A.M. Rebrii // Collection of abstracts based on the materials of the 29th International Scientific and Practical Conference "Technologies of the 21st Century", November 20-22, 2023. Part 2: abstracts supplement . – Sumy: SNAU, 2023. – P.121
11. Rebriy A.M. Computer graphics - a tool for improving the quality of students' knowledge / A.M. Rebrii // Materials of the scientific and practical conference

- of teachers, postgraduates and students of Sumy NAU, May 14-16, 2024: abstracts supplement . - Sumy: SNAU, 2024. - P.558
- 12.Rebrii A.M. Application of the Autodesk computer-aided design system Inventor in the training of specialists with a higher education degree of "bachelor" / A.M. Rebrii , I.O. Rybenko , // 3rd International Scientific and Practical Conference « Global Trends in the Development of Information Technology and Science ", Stockholm , Sweden April 2-4, 2025, pp. 49-52.
 - 13.Rebrii A. M. New technologies of teaching and learning / A. M. Rebrii // Materials of the 31st international scientific and practical conference Innovative technologies in industry 5.0, October 21-23, 2025: abstracts of supplementary part 2 - Sumy: SNAU, 2025. – P.122
 - 14.Rebrii A.M. Use of information technologies in agricultural engineering / A.M. Rebrii , // Materials of the scientific and practical conference of teachers, postgraduates and students of Sumy NAU, April 13-17, 2026: abstracts supplement . - Sumy: SNAU, 2026. - P.317.
 - 15.Free web browser, (web browser) from Google - Google Chrome .
 - 16.[https://iq.vntu.edu.ua/fm/fdb/1056/%D0%9F%D0%BE%D1%81%D1%96%D0%B1%D0%BD%D0%B8%D0%BA_%D0%9A%D0%BE%D1%80%D0%BC%D0%B0%D0%BD%D0%BE%D0%B2%D1%81%D1%8C%D0%BA%D0%B8%D0%B9_\(1\).pdf](https://iq.vntu.edu.ua/fm/fdb/1056/%D0%9F%D0%BE%D1%81%D1%96%D0%B1%D0%BD%D0%B8%D0%BA_%D0%9A%D0%BE%D1%80%D0%BC%D0%B0%D0%BD%D0%BE%D0%B2%D1%81%D1%8C%D0%BA%D0%B8%D0%B9_(1).pdf) .
 - 17.https://nmetau.edu.ua/file/inzhenerna_grafika.pdf .