Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA (RUDN University) named after Patrice Lumumba

Institute of Environmental Engineering

COURSE SYLLABUS

REMOTE SENSING OF MSW OBJECTS

Recommended by the Didactic Council for the Education Field for the specialization:
05.04.06 "Ecology and nature management"

The course instruction is implemented within the professional education programme of higher education:
«Integrated Solid Waste Management»

2026

1. COURSE GOAL(s)

The discipline "Remote Sensing of MSW Objects" is part of the Master's program "Integrated Municipal Solid Waste Management" in the field of study 05.04.06 "Ecology and Environmental Management" and is studied in the 1st semester of the 1st year. The discipline is delivered by the Department of Rational Nature Management. The discipline consists of 4 sections and 11 topics and is aimed at the in-depth study of Earth remote sensing methods and the features of their application for solving the problems of integrated management of production and consumption waste.

The aim of the discipline is for students to:

Know:

- theoretical foundations of remote sensing;
- mechanisms and principles of obtaining remote sensing images;
- basic techniques for photointerpretation of remote sensing images;
- basic techniques of geoinformatics.

Be able to:

- use methods of aerial and space image photointerpretation to solve practical problems in the management of production and consumption waste;
- use GIS software to solve practical tasks;
- use spectral indices to solve practical tasks;
- use spatial analysis of territory to solve practical tasks.

Own (possess skills in):

- skills in working with design and engineering documentation;
- skills in working with regulatory and legal documentation.

2. REQUIREMENTS FOR COURSE OUTCOMES

The study of the discipline "Remote Sensing of MSW Objects" is aimed at developing the following competencies (or parts thereof) in students:

Table 2.1. List of competencies developed in students during the study of the discipline (learning outcomes of the discipline).

Competence code	**Competence descriptor**	**Competence formation indicators** (within this course)
PC-8	Has mastery of skills in the preparation of thematic maps and plans, and analytical information derived from engineering-environmental investigations.	**GC-8.1** Has mastery of skills in the preparation of thematic maps and plans, and analytical information derived from engineering-environmental investigations;
		GC-8.2 Capable of collecting, analyzing, and synthesizing materials on the cartographic coverage of a territory, hydrometeorological observations, and surveys from previous years; information on the

		presence and nature of hazardous processes and phenomena; cartographic materials, aerial photography, space and topographic survey data; navigation charts and other sources;
		GC-8.3 Capable of applying contemporary information technologies and specialized software for the processing and analysis of the data obtained.
PC-5	Capable of developing typical environmental protection measures and conducting an impact assessment of proposed facilities or other forms of activity on the environment.	**PC-5.1** Capable of performing an environmental impact assessment of a proposed enterprise and its facilities, as well as forecasting and evaluating adverse effects;
		PC-5.2 Capable of developing standard environmental mitigation measures;
		PC-5.3 Has mastery of skills in environmental design and the preparation of specialized documentation at the pre-design stage of the project life cycle.
PC-12	Capable of utilizing modern Geographic Information System (GIS) tools and information and communication technologies (ICT) in professional practice.	**PC-12.1** Can use modern information technologies and specialized programs to process received data and analyze them **PC-12.2** Able to use modern means of geographic information systems and information and communication technologies in professional activities

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline «Remote Sensing of MSW objects» is allocated to the component shaped by the participants of educational relations within Block 1 "Disciplines (Modules)" of the higher education program.

Within the context of the higher education program, students also engage with other disciplines and/or practical training activities that facilitate the attainment of the intended learning outcomes of the course "Mapping and GIS-technologies in MSW Management."

Table 3.1 *The list of the higher education programme components that contribute to the achievement of the expected learning outcomes*

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
PC-8	Has mastery of skills in the preparation of thematic maps and plans, and analytical information derived from engineering-environmental investigations.	no	Research Work; Pre-Graduation Practice
PC-5	Capable of developing typical environmental protection measures and conducting an impact assessment of proposed facilities or other forms of activity on the environment.	no	Research Work; Work Experience Internship; Pre-Graduation Practice;
PC-12	Able to use modern means of geographic information systems and information and communication technologies in professional activities	no	Research Work; Pre-Graduation Practice;

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the discipline is **4** credit units.

Table 4.1. Types of academic activities during the period of the HE program(me) mastering

Types of academic activities		**Total hours**	**Semester(s)**			
			1	**2**	**3**	**4**
Contact academic hours		54	54			
Lectures		18	18			
Lab works		36	36			
Seminars (workshops/tutorials)		0	0			
Self-study		*72*	*72*			
Evaluation and assessment (exam; pass/fail grading)		*18*	*18*			
The total course workload	hours	**144**	**144**			
	credits	**4**	**4**			

5. COURSE CONTENT

Table 5.1. Course Modules and Contents

Title of Course Modules		Content	Types of academic activities
1.	Introduction.	**1.1** The study of the physical basics for Earth Remote Sensing, the study of types and means for remote sensing. **1.2** Remote sensing data processing software: a variety of GIS. **1.3** QuantumGIS. **1.4** Openstreetmaps, satellite images, georeferencing**.**	L, Lb
2.	Basic principles of remote sensing, classification of remote sensing methods	**2.1** Photointerpretation. photointerpretation signs. Features of recognition of artificial and natural objects.. **2.2** Semi-automatic classification. Multispec.	L, Lb
3.	Methods for solving problems using remote sensing and GIS tools	**3.1** Spectral Indices.. **3.2** The diverse range of ecological tasks that can be addressed using geographic information systems (GIS) **3.3** Spatial analysis of GIS, a method for analyzing hierarchies.	L, Lb
4.	RSE methods to solve MSW tasks	**4.1** Landfills. The main deciphering signs of unauthorized dumps. Methods for determining unauthorized dumps.. **4.2** Geoecomarketing	L, Lb

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the course (if necessary)
Lecture	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia

Seminars	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless	projector, laptop, projection screen, stable wireless Internet connection. Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype. Microsoft Windows 7 corporate. License No. 5190227, date of issue March 16, 2010 MS Office 2007 Prof , License # 6842818, date of issue 09/07/2009
Computer Lab	Computer Lab for conducting classes, group and individual consultations, current control and intermediate certification, equipped with personal computers (in the amount of 12), a board (screen) and technical devices of multimedia presentations.	QuantumGIS, Multispec
For Self-Study	Classroom for self-study (can be used for seminars and consultations), equipped with a set of devices includes laptop, stable wireless.	No

7. RECOMMENDED SOURCES FOR COURSE

STUDIES a) **Main reading:**

1. Martin Wegmann , Jakob Schwalb-Willmann , Stefan Dech An Introduction to Spatial Data Analysis: Remote Sensing and GIS with Open Source Software (Data in the Wild) 1st Edition, Kindle Pelagic Publishing, 2020

2. E.O. Wilson , Dawn J. Wright , Christian Harder GIS for Science, Volume 3: Maps for Saving the Planet. Esri Press, 2021

3. Jindong Li Satellite Remote Sensing Technologies Springer, Singapore, Space Science and Technologies, 2021 https://link.springer.com/book/10.1007/978-981-15-4871-0

4. Remote Sensing and Image Interpretation, 7th Edition, Thomas Lillesand , Ralph W. Kiefer , Jonathan Chipman https://www.geokniga.org/bookfiles/geokniga-remote-sensingandimage-interpretation.pdf

5. Ujaval Gandhi End-to-End Google Earth Engine (Full Course Material) A hands-on introduction to applied remote sensing using Google Earth Engine. https://courses.spatialthoughts.com/end-toend-gee.html

6. Otto Huisman and Rolf A. de By Principles of Geographic Information Systems An introductory textbook The International Institute for Geo-Information Science and Earth Observation (ITC), webapps.itc.utwente.nl

7. Jonathan Campbell, MIchael Shin, UCLA Essentials of Geographic Information Systems, Publisher: Saylor Foundation https://open.umn.edu/opentextbooks/formats/249

Additional reading

1. Jonathan Campbell, MIchael Shin, UCLA Essentials of Geographic Information Systems, Publisher: Saylor Foundation https://open.umn.edu/opentextbooks/formats/249
2. T. Takagi, T. Oguchi, J. Matsumoto, MJ Grossman, MH Sarker, MA Matin (2007) Channel braiding and stability of the Brahmaputra River, Bangladesh, since 1967: GIS and remote sensing analyses, Geomorphology 85, 294–305.
3. John D. Bossler; John R. Jensen; Robert B. McMaster; Chris Rizos, (Editors), 2001. Photogrammetric and remote sensing considerations; Chapter 16, Manual of Geospatial Science and Technology, Vol 1 Part 4 Pages 233 – 252
4. John D. Bossler; John R. Jensen; Robert B. McMaster; Chris Rizos (Editors), 2001. The remote sensing process: how do we collect the required in situ and remotely sensed data? Chapter 17, Manual of Geospatial Science and Technology, November 2001, Vol 1 Part 4 Pages 253 – 275K
5. George Joseph: Fundamentals of Remote Sensing; Universities Press India Pvt Ltd, Hyderabad,India Editors: John D. Bossler; John R. Jensen; Robert B. McMaster; Chris Rizos, 2001. Manual of Geospatial Science and Technology, November 2001, Vol 1 Part 1and II
b) databases, information and reference and search systems, Internet sources:

1. Interregional public organization for promoting the development of the market for geoinformationtechnologies and services Web site of the GIS Association: http://www.gisa.ru
2. Association of developers, manufacturers and consumers of equipment and applications based on global navigation satellite systems "GLONASS / GNSS-Forum": http://aggf.ru/
3. Intersectoral journal of navigation technologies Vestnik GLONASS: http://vestnik-glonass.ru/
4. State and prospects of the Russian satellite navigation market in 2010: an analytical review. – M: 2011 http://aggf.ru/analitika/AGGF_2011.pdf
5. Introduction to geoinformation systems / Web-site "GIS-Lab and authors" (http://gislab.info/docs/giscourse), Aug. 2007
6. Basic GIS - RECOD platform. http://ssc.rekod.ru/content/services/3

Internet-based sources

1. ELS of RUDN University and third-party ELS, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System - RUDN EBS http://lib.rudn.ru/MegaPro/Web
- ELS "University Library Online" http://www.biblioclub.ru
- EBS Yurayt http://www.biblio-online.ru
- ELS "Student Consultant" www.studentlibrary.ru
- EBS "Lan" http://e.lanbook.com/
- EBS "Trinity Bridge"

2. Databases and search engines:

- electronic fund of legal and normative-technical documentation http://docs.cntd.ru/
- Yandex search engine https:// www .yandex.ru/
- Google search engine https://www.google.ru/
- abstract database SCOPUS http:// www .elsevierscience.ru/ products / scopus /

8. MID-TERM ASSESSMENT AND EVALUATION TOOLKIT

Evaluation materials and a point- rating system* for assessing the level of competence formation (part of competences) based on the results of mastering the discipline **Mapping and GIS-technologies in MSW Management** are presented in the Appendix to this Work Program of the discipline.

DEVELOPER:

Associate Professor of the NM Department		**Kapralova D.O.**
Position	Signature	Name, Surname

HEAD OF DEPARTMENT:

Director of the NM department		**Kucher D.E.**
Position	Signature	Name, Surname

HEAD OF PROGRAMME:

Associate Professor of the NM Department		**Kapralova D.O.**
Position	Signature	Name, Surname

Department Environmental Management

APPROVED
Department meeting protocol
No_____, Dated
_____
___
_
___ day, month, year
Head of Educational Department
_____(Kuc her D.E.) signature

ASSESSMENT TOOLKIT

for the course

Remote Sensing of MSW objects
course title

05.04.06 "Ecology and nature management"
field of studies / speciality code and title

«Integrated Solid Waste Management
higher education programme profile/specialisation title

master
graduate's qualification (degree)

Passport to Assessment Toolkit for Course Remote

Sensing of MSW objects

Field of Studies / Speciality 05.04.06 "Ecology and nature management"

Course: Remote Sensing of MSW objects

Competences (competences in part) under assessment	**Course module under assessment**	**Course topic under assessment**	**Tools to assess higher education programme**				
			Class work				**S u**
			Oral quiz	**Test**			
GC-7 PC-5 PC-12	Introduction.	Study of the physical foundations of remote sensing of the Earth, study of types and means of remote sensing of the Earth.	0.5	1	5		
		Software for processing remote sensing data: types of	0.5	1	5		
		QuantumGIS interface, loading raster data, creating vector layers Satellite Imagery	0.5	1	5		
		Types of Satellites and Missions, Open Image Sources	0.5	1	5		
GC-7 PC-5 PC-12	Basic principles of Earth remote sensing, classification of Earth remote sensing methods	Decoding. Features of recognition of artificial and natural objects	0.5	1	5		
		Semi-automatic classification	0,5	1	10		

GC-7 GPC-3 PC-5 PC-12	Methods for solving problems using remote sensing and GIS tools	Spatial GIS analysis, hierarchy analysis method. Cluster analysis, Geoecomarketing Vegetation indices, groups of vegetation indices. Landscape indices. Landfills. The main decipherable signs of unauthorized landfills. Methods for identifying unauthorized dumps. Web GIS, Google Earth Engine.	***0.5***	***1***	***5***		
		Spatial GIS analysis, hierarchy analysis method. Cluster analysis, Geoecomarketing	***0.5***	***1***	***10***		
		Vegetation indices, groups of vegetation indices.	***0.5***	***1***	***10***		
		The main decipherable signs of unauthorized landfills. Methods for identifying unauthorized dumps.	0.5	1	10		
		Web GIS, Google Earth Engine.	5	10	70		
		Total	5	10	***0.5***		

Passport to Assessment Toolkit for Course Remote Sensing of MSW

objects

QUESTION CARD No 1

QUESTION 1 Application of remote sensing data for waste management purposes
QUESTION 2 Classification of objects by image contras

Developer_____(Kapralova D.O.)
signature

Head of Educational Department_____(Kucher D.E.)
signature

_____
_____ day, month, year

Pass/Fail assessment QUESTIONS

List of theoretical questions for testing

1. Direct signs of decryption.
2. Factors affecting the tone (brightness) of the image.
3. Calculating the size of an object based on its shadow.
4. Methods for determining the image scale.
5. Types of shape of objects in the picture.
6. Classification of objects by image contrast.
7. The concept of image structure. Types of structures.
8. The concept of image texture. Types of image textures.
9. Generalization during decoding.
10. Application of Earth remote sensing data to assess climate change
11. Name the groups of decryption features.
12. What patterns is the use of indirect signs based on?
13. What is the object of landscape mapping?
14. The concept of remote sensing.
15. Earth remote sensing satellites.
16. Active remote sensing
17. Passive remote sensing.
18. Spectral, spatial, radiometric resolution.
19. Vegetation indices.
20. Landscape indices.
21. The main technical factors influencing the information content of satellite images are

22. Supervised/unsupervised classification
23. Concept of GEE. Possibilities
24. LST what is it
25. What is meant by remote sensing?
26. What are the main advantages of using remote sensing?
27. Characterize the main stages in the development of Earth remote sensing technologies. Name the main trends in the development of Earth remote sensing technologies.
28. Describe the steps in remote sensing and data analysis.
29. What are the transparency windows of the earth's atmosphere?
30. What methods exist for transmitting remote sensing data to Earth?
31. What data formats are mainly used in remote sensing?
32. Name the main elements of the ground and orbital segments of Earth remote sensing systems.
33. What are the main characteristics of remote sensing data? 34. What characteristics of the CS depend on the satellite's altitude?
35. How is computer interpretation of images performed?
36. Describe the steps in image interpretation.
37. What equipment is used for decryption?
38. What are the methods of automated decryption?
39. What is image correction and restoration used for?
40. What is the difference between improving the visual perception of pictures and converting images? What are they used for?
41. In what areas can remote sensing data be used?
42. How can you estimate the sown area?
43. How can remote sensing data be used to study urban growth?
44. How can remote sensing data be used to study illegal dumping?
45. How can remote sensing be used to prevent and combat the consequences of emergency situations?
46. In what main areas are Earth remote sensing data used in solving problems of assessing natural resources and the environment?
47. What are the requirements for software solutions in the field of Earth remote sensing?
48. What are the stages of primary processing of Earth remote sensing data?
49. What is an orthorectified image and an orthomosaic?
50. Define the concept of interferometry.
51. Describe the process of constructing digital elevation models using radar survey materials.
52. In what areas is remote sensing radar equipment primarily used?
53. What are the benefits of active remote sensing?
54. What is the purpose of the geocoding process?
55. What are georeferencing, geocoding and orthorectification?

The set of exam question cards is complemented by the assessment criteria developed by the teacher and approved at the department meeting.

Assessment criteria:
(*in compliance with the legal regulations in force*)

Test question examples

1. The main technical factors affecting the information content of satellite images are
   - Composition of the atmosphere
   - Used equipment
   - country of satellite origin
   - Orbit type (or flight altitude) Presence of clouds - shooting season
2. Atmospheric windows are:
   - parts of the electromagnetic spectrum that are not absorbed by the atmosphere
   - parts of the electromagnetic spectrum that are absorbed by the atmosphere
   - parts of the electromagnetic spectrum that the atmosphere reflects
   - territories of countries over where satellites can shoot
3. The spectral channel is:
   - Set of intervals of the electromagnetic spectrum
   - The interval at which the sensor is set to take a picture
   - Full interval of all existing wavelengths of electromagnetic radiation
4. Radiometric properties of aerospace images characterize
   - The amount of radio radiation of objects
   - The ability of images to reproduce small details and colors of the scene - Wavelength when shooting
5. When using active methods od remote sensing
   - the satellite sends a signal of its own energy source to Earth
   - the satellite registers the reflection of radiation
   - satellite turns on by itself

Laboratory works tasks

1. Working with rasters - binding, cropping, assembly, drawing up a 3D model based on, building a profile
2. Counting points in polygons, building thematic maps and editing them

(graded sign, 2.5d, diagrams)

3. OSM, using OpenStreet Services
4. Vegetation indices, NDVI calculation
5. Determination of changes in time

- vectorization of NDVI, determination of the difference,
- sample raster values on the layer with NDVI, plotting based on the values of random points over the years)

1. Supervised/unsupervised classification in Multispec

2. Semi-automated search for landfills - a combination of work in Multispec and QGIS
3. Geoecomarketing

• Note * Practice case/task inclusion is subject to the teacher's discretion.

Example of Lab work task

Lab #1: Introduction to the Quantum Interface GIS interface (version 3.22)

Toolbars and basic menu commands

The purpose of the work : to get an idea about the Quantum software product GIS 3.22.

Explore the main features of the program. *Tasks:*

1. Launching the program and opening attribute tables.
2. Acquaintance with the main toolbars, menu commands and their purpose.
3. Open the QGIS 3.22 folder, run the program by clicking on QGIS Desktop 3.22.4

4. You can create a new project or open recent

5. The three main toolbars in QGIS contain buttons representing the most commonly used commands, procedures, and tools. 4)

5) You can enable additional panels by right-clicking on an empty space in the top panel. Connected panels are visible in the list that appears.

Assessment criteria:

(*in compliance with the legal regulations in force*)

The assessment of all results of mastering competencies is carried out in accordance with the scale of the international point-rating system ECTS. In accordance with the calculated grading system, the student gains the required points.

Work in class: depends on the complexity of the topic.

The grade is given for attendance and active work at a seminar or lecture (lectures are held in an interactive form) - answers to current questions, notes,

discussion. The student is present at the lesson, participates in the discussion, does not hesitate to answer questions - maximum score. The student is absent or the task is not prepared - 0 points.

Lab works – work is done – 5 points, laboratory work is not completed – 0 points.

Tasks of Self-studies: - acquisition of skills of independent practical work in the recommended software and application of various research methods; - developing the ability to independently and critically apply the material being studied. The SR technology should ensure the acquisition of knowledge, the consolidation and systematization of knowledge, the formation of skills and abilities. The proven technology is characterized by an algorithm that includes the following logically related student actions: - reading a text (textbook, manual, lecture notes); - note-taking of the text; - problem solving and exercises; - answers to control questions;

Final certification: A student is considered to have successfully passed the milestone or final certification if the total score for all activities at the time of certification exceeds 50% of the maximum possible score (lecture work, practical assignment, tests).

The final grade for the semester is added up as the sum of points for all types of student activities (*see toolkit passport) and can reach a maximum of 85 points, the article as obligatory for excellent mark.

The final test is given by the student voluntarily, if he scored the minimum possible score for certification - 51 points. In other cases, the test is mandatory and is estimated at a maximum of 10 points, as a result, the total score is derived taking into account the result of passing the test and the final grade corresponds to the international ECTS scale.

Tentative list of assessment tools

№ / п	Assessment tool	Brief features	Assessment tool representation in the kit
		Class work	
2		A system of standardised tasks that allows the teacher to automate the procedure for measuring the student's level of knowledge and skills	Tests bank
4		A tool of control organised as a classroom lesson, at which students need to independently demonstrate the acquisition and mastering of the educational material of the course topic, section, or sections.	Questions on the course topics /modules

	c r k		
5	Lab work	The system of practice tasks aimed at the students' practical skills formation	
10	Pass/Fai l asse ssment	A tool for checking the quality of students' performance of laboratory work, acquisition and mastering of the practice training and seminar educational material, successful completion of the advanced field internship and pre-graduate internship and fulfillment of all training assignments in the course of these internships in accordance with the approved programme.	
11	Exam	The evaluation of the student's work during the semester (year, the entire period of study, etc.); it is designed to identify the level, soundness and systematic nature of theoretical and practical knowledge gained by the student, formation of independent work skills, development of creative thinking, ability to synthesise the acquired knowledge and apply it to solve practice tasks.	es of l
14	Multi-level tasks and assign ments with varying difficul ty	The tasks and assignments differ in terms of the following levels: a. reproductive level allows the teacher to evaluate anddiagnose the students' knowledge of factual material (basic concepts, algorithms, facts) and the students' ability to correctly use special terms and concepts, recognize objects of study within a certain section of the discipline, b. reconstructive level allows the teacher to evaluateand diagnose the students' abilities to synthesise, analyse, generalise factual and theoretical material and formulate specific conclusions, establish cause-andeffect relationships, c. creative level allows to evaluate and diagnose students' skills to integrate knowledge of various fields, argue their own point of view.	Set of multilevel tasks and assignme n ts with varying difficulty
Self- studies			
8	Homework	The tasks and assignments differ in terms of the following levels:	Set of multilevel tasks and

		a. reproductive level allows the teacher to evaluate anddiagnose the students' knowledge of factual material (basic concepts, algorithms, facts) and the students' ability to correctly use special terms and concepts, recognize objects of study within a certain section of the discipline, b. reconstructive level allows the teacher to evaluateand diagnose the students' abilities to synthesise, analyse, generalise factual and theoretical material and formulate specific conclusions, establish cause-andeffect relationships, c. creative level allows the teacher to evaluate and diagnose students' skills to integrate knowledge of various fields, argue their own point of view.	assignments with varying difficulty

Criteria for assessing students knowledge

Points BRS	Traditional grades in the Russian Federation	Points for transferring grades	Grades	ECTS grades
86 - 100	5	95 – 100	5+	A
		86 – 94	5	B
69 - 85	4	69 – 85	4	C
51 - 68	3	61 - 68	3+	D
		51 - 60	3	E
0 - 50	2	31 - 50	2+	FX
		0 - 30	2	F

Explanation of the rating table:

A	"Excellent" - the theoretical content of the course is mastered completely, without gaps, the necessary practical skills for working with the mastered material are formed, all the training tasks provided for by the training program are completed, the quality of their implementation is estimated by a number of points close to the maximum.
B	"Very good" - the theoretical content of the course is mastered completely, without gaps, the necessary practical skills for working with the mastered material are basically formed, all the training tasks provided for by the training program are completed, the quality of most of them is estimated by a number of points close to the maximum.

C	“Good” - the theoretical content of the course has been mastered completely, without gaps, some practical skills in working with the mastered material are not sufficiently formed, all the training tasks provided for by the training program have been completed, the quality of none of them has been assessed with a minimum number of points, some types of tasks have been completed with errors.
D	“Satisfactory” - the theoretical content of the course has been partially mastered, but the gaps are not significant, the necessary practical skills for working with the mastered material are basically formed, most of the training tasks provided for by the training program have been completed, some of the completed tasks may contain errors.
E	“Mediocre” - the theoretical content of the course is partially mastered, some practical work skills are not formed, many training tasks provided for by the training program are not completed, or the quality of some of them is estimated by a number of points close to the minimum.
FX	“Conditionally unsatisfactory” - the theoretical content of the course has been partially mastered, the necessary practical skills have not been formed, most of the training tasks provided for by the training program have not been completed, or the quality of their implementation has been assessed with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the implementation of educational tasks.
F	**“** Definitely unsatisfactory” - the theoretical content of the course has not been mastered, the necessary practical work skills have not been formed, all the 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.