Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA
(RUDN University)

Institute of Environmental Engineering

COURSE SYLLABUS

IT in Ecology and Natural Resources Management

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»
(Network program with L.N. Gumilyov Eurasian National University)

2025

1. COURSE GOAL(s)

The course is designed to help students in formation of competences in accordance with the state educational standard in the direction 05.04.06, including:

- Learning the basics of climate project management.
- Formation of knowledge about methods of structuring and management of climate projects.
- Developing skills in using modern tools for climate project management.
- Developing skills in preparing a justification and developing a climate project plan.

In order to realise the set goal, the following tasks are solved in the course of teaching the course:

- Formation of ideas about the range of tasks solved in the professional and scientific activities of an ecologist, including the development and management of climate projects, with the help of publicly available and specialised computer programs;
- developing the skill of using computer tools to solve practical problems in the field of future professional activity;
- developing an understanding of the role, significance and limitations of statistical methods in scientific and practical economic and environmental research;
- formation of skill of application of modern computer means for data search, statistical data processing, determination of regularities and forecasting in solving problems of future professional and scientific activity.

• 2. REQUIREMENTS FOR LEARNING OUTCOMES

The process of studying the discipline is aimed at the formation of the following competencies:

Competence code	Competence descriptor	Competence formation indicators
GC-1	Able to carry out a problem situations critical analysis based on a systematic approach, able to develop an action strategy	**GC-1.1** can analyze the problem situation as a system, identifying its components and the links between them
		GC-1.2 owns argumentation and develops a meaningful strategy for solving a problem situation based on a systematic and interdisciplinary approach
		GC-1.3 knows the basic strategies and identifies possible risks, suggesting ways to eliminate them
GC-7	Able to find the necessary sources of information and data as well as to perceive, analyze, remember and transmit information using digital tools. Able to control information, its reliability, drawing logical conclusions based on incoming information and data, when working with information obtained from various data sources.	**GC-7.1** owns the skills in digital technologies use and search methods
		GC-7.2 can process, analyze, store and correctly present information
		GC-7.3 knows the principles and techniques of modern corporate information culture and the digital economy basics
GPC-5	Able to solve the professional activity problems in ecology, environmental management and protection using information and	**GPC-5.1** knows how to choose and apply algorithm for solving environmental problems and implements algorithms using software
		GPC-5.2 owns the skills to use information technology tools for searching, storing, processing, analyzing and presenting information

	communication, including geoinformation technologies	**GPC-5.3** can process earth remote sensing data and use cartographic materials, owns modern GIS technologies

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Course ***IT in Ecology and Natural Resources Management*** refers to the **Mandatory part** of the block 1 of the curriculum.

Within the higher education programme students also master other disciplines (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course.

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*
GC-1	Able to carry out a problem situations critical analysis based on a systematic approach, able to develop an action strategy	No	Climate Project Development; Carbon Test Areas and GHG Monitoring
GC-7	Able to find the necessary sources of information and data as well as to perceive, analyze, remember and transmit information using digital tools. Able to control information, its reliability, drawing logical conclusions based on incoming information and data, when working with information obtained from various data sources.	No	State Exam; Master's Thesis Defence
GPC-5	Able to solve the professional activity problems in ecology, environmental management and protection using information and communication, including geoinformation technologies	No	State Exam; Master's Thesis Defence Remote Sensing Technics for Climate Change Assesment Geoinformatics for Enterprise Carbon Neutrality

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course 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	*34*	*34*			
Lectures	17	17			
Lab works					
Seminars (workshops/tutorials)	17	17			
Self-study	*83*	*83*			

Types of academic activities		Total hours	Semester(s)			
			1	2	3	4
Evaluation and assessment (exam; pass/fail grading)		*27*	*27*			
The total course workload	hours	**144**	**144**			
	credits	**4**	**4**			

5. COURSE CONTENTS

Table 5.1. The content of the discipline (module) by type of educational work

Title of Course Modules	Content	Types of academic activities
Module 1. Application of computer technologies in the Practical work of an Ecologist	Topic 1.1. Internet resources containing legal and statistical information. Scientific citation databases and scientific social networks	L
	Topic 1.2. Specialized programs for complex calculations on environmental impact assessment, risk analysis. Software tools for processing text and graphic images	L, S
	Topic 1.3. Application of standard office suite computer programs for solving standard and non-standard practical tasks, performing economic and environmental calculations	
Module 2. Statistical data processing using computer programs	Topic 2.1. Primary processing of statistical data	L, S
	Topic 2.2. Estimation of characteristics of the general population.	L, S
	Topic 2.3. Testing statistical hypotheses.	L, S
	Topic 2.4. ANOVA test	L, S
Module 3 . Analysis of experimental data and forecasting	Topic 3.1. Correlation and regression analysis	L, S
	Topic 3.2. Analysis of dynamic series and forecasting	L, S

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	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
Seminars	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless	
For Self-Study	Classroom for self -study (can be used for	

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the course (if necessary)
	seminars and consultations), equipped with a set of devices includes laptop, stable wireless.	MS Office 2007 Prof , License # 6842818, date of issue 09/07/2009

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main reading:

1. Ledashcheva T.N., Pinaev V.E. Computer processing of statistic data: practice. M., RUDN, 2021
2. V. Pinaev, T. Ledashcheva. Environmental impact fee calculation in Russia for EIA – modern practices. 2nd edition. M.: Mir Nauki, 2022. – https://izdmn.com/PDF/39MNNPU22.pdf.

Additional reading:

1. P. Golinska, M. Fertsch. Information Technologies in Environmental Engineering2011. Environmental Science and Engineering, ISSN 1863-5520 Monograph , Electronic resource : http://www.springerlink.com/openurl.asp?genre=book&isbn=978-3-642-19535-8 Library RUDN University
2. Eric D. _ Kolaczyk . statistical analysis of network Data [Electronic resource] : Monograph / D . K. _ Eric . - Electronic text data. - : Springer New York , 2009. Access mode: http://www.springerlink.com/openurl.asp?genre=book&isbn=978-90-481-3099-3

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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. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION

The assessment toolkit and the grading system to evaluate the level of competences (competences in part) formation as results of mastering the discipline are specified in the Appendix to the syllabus.

DEVELOPER:

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Position	Signature	Name, Surname

HEAD OF DEPARTMENT:

Position	Signature	Name, Surname
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ASSESSMENT TOOLKIT

IT in Ecology and Natural Resources Management

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

The course instruction is implemented within the professional education programme of higher education:

Climate Project Management

2025

Passport to Assessment Toolkit for Course
IT in Ecology and Natural Resources Management

Education Field / Speciality 05.04.06 "Ecology and nature management"/ «Climate Project Management»
Course: IT in Ecology and Natural Resources Management

Competences (competences in part) under assessment	Course module under assessment	Course topic under assessment	Tools to assess higher education programme mastering level				Points for topic	Points for module
			Class work	Self-studies		Pass-fail		
			Quiz	Homework	Calculation and graphic work	Pass/Fail testing		
GC-1	Module 1: Application of computer technologies in the Practical work of an Ecologist	Topic 1: Internet resources containing legal and statistical information. Scientific citation databases and scientific social networks.	1		1		2	6
GC-7, SPC-5		Topic 2: Specialized programs for complex calculations on environmental impact assessment, risk analysis. Software tools for processing text and graphic images	1	1			2	
GC-1, GC-7, SPC-5		Topic 3: Application of standard office suite computer programs for solving standard and non-standard practical tasks, performing economic and environmental calculations	1	1			2	
GC-1, GC-7,	Module 2: Statistical data processing using computer programs	Topic 1: Primary processing of statistical data	1	2	3	2	8	47
GC-1, GC-7,		Topic 2: Estimation of characteristics of the general population	1	2	2	2	7	
GC-1, GC-7, SPC-5		Topic 3: Testing statistical hypotheses	2	6	8	6	22	
GC-1, GC-7, SPC-5		Topic 4: Tasks of Variance analysis	1	2	4	2	9	
GC-1, GC-7, SPC-5	Module 3: Testing the	Topic 1: Tasks of Correlation and regression analysis	1	4	14	4	24	47

GC-1, GC-7, SPC-5	statistical hypothesis	Topic 2: Analysis of dynamic series and forecasting	1	2	18	2	23	

Tentative list of assessment tools

No	Assessment tool	Brief features	Assessment tool representation in the kit
		Class work	
1	Survey/Quiz	A tool of control, organised as a special conversation between a teacher and students on topics related to the course under study, and designed to clarify the amount of students' knowledge in a particular section, topic, problem, etc.	Questions on the course topics /modules
2	Pass/Fail assessment	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.	Test
		Self- studies	
1	Calculation and graphic work	A tool for checking students' skills in applying the acquired knowledge according to a predetermined methodology in task solving or fulfilling assignments for a module or discipline as a whole.	Set of tasks for calculation and graphic work
2	Homework	The tasks and assignments differ in terms of the following levels: a) reproductive level allows the teacher to evaluate and diagnose 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 evaluate and diagnose the students' abilities to synthesise, analyse, generalise factual and theoretical material and formulate specific conclusions, establish cause-and-effect 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.	Set of multi-level tasks and assignments with varying difficulty

Department of Environmental Safety and Product Quality Management

Set of tasks for calculation and graphic work

for the course IT in ecology and natural resources management

Task	Assessment criteria	Points
1. Find current statistical data on birth rates in the regions of the Russian Federation. According to these data:	Data found and correctly collected (by regions of the Russian Federation, not including average data by federal districts)	1
1.1. Construct an equal-interval series, a histogram, calculate the characteristics of the sample, make an assumption about the type of distribution.	Correct fulfilment of elements: An equal-interval series is constructed The mean and sample variance An assumption is made about the type of distribution	 1 1 1
1.3. Construct an equal-interval series, a histogram, calculate the characteristics of the sample, make an assumption about the type of distribution.	Correctly and reasonably constructed estimate/ Correctly constructed estimate, no justification given	2/1
1.4. Test the hypothesis that the mean values of the indicator are equal in 2000 and 2006 (or other two years presented in the data)	Criterion selected and justified The criterion is correctly applied Correct conclusion is made	1 2 1
1.5. Test the hypothesis of equality of dispersions of the indicator for the same years	Criterion selected and justified The criterion is correctly applied Correct conclusion is made	1 2 1
1.6. Analyze the presence or absence of significant differences by districts: CFD, NWFD, SFD based on the last year's data	Criterion selected and justified The criterion is correctly applied Correct conclusion is made	1 2 1
1.7. Construct a hypothesis about the dependence of fertility on 3-4 factors (e.g. GRP, emissions to air from stationary sources, ...) and test it by conducting correlation and regression analysis (including analysis of the quality of the regression equation).	Hypothesis was constructed, statistical data was selected Visual pairwise analysis was performed The use of a specific correlation coefficient is justified Correlation coefficients are correctly calculated Significance of correlation coefficients was checked The correlation matrix was analysed and factors were selected The regression equation was correctly constructed Quality and significance of 3 items were checked Correct conclusions are formulated	2 1 1 1 1 1 2 3

		2
2. Analyze the dynamics of the indicator for the last 15 years by conducting a time series analysis (including construction and analysis of the quality of the trend equation, analysis for the presence of a cyclical component, forecast of the indicator for the next year and analysis of the quality of the forecast).	Classification of the dynamic series is carried out Characteristics are calculated Visual analysis was performed Trend equation was built The quality of the trend equation was analysed by 3 points Residuals were analysed for autocorrelation Qualitative conclusions were made Point forecast for the next time period was made Interval forecast was made The quality of the forecast was analysed	1 3 2 1 3 3 2 1 1 1

Department of Environmental Safety and Product Quality Management

Set of assignments for control work

for the course IT in ecology and natural resources management

1. Statistics studies:
a) single factors and phenomena;
b) mass phenomena of any nature;
c) both single and mass phenomena.

2. A variation series is:
a) a set of features of an object, arranged in a certain order;
b) distribution of units of the population of objects by one of the features;
c) units of the population, arranged in the order of increasing or decreasing values of a feature.

3. The mean is:
a) the value of a trait that is in the middle of the distribution series;
b) a generalized typical characteristic of a
trait
in a given population;
c) the value of a trait occurring in the majority of elements of the population.

4. The mode in a distribution series is:
(a) The highest frequency in the variation series;
b) the highest value of the trait;
c) the value of the trait corresponding to the highest frequency;
d) the value of the trait dividing the distribution series into two equal parts.\

5. The median in a distribution series is:
(a) The highest frequency in the variation series;
b) the highest value of the trait;
c) the value of the trait corresponding to the highest frequency;
d) the value of the trait dividing the distribution series into two equal parts.

6. Variation is:
a) change, some deviation from the main direction of development;
b) variability (deviation) of individual values of a feature by units of the population;
c) application of the basic rule in different modifications.

7. The following statistical measures are used to measure the variation in the value of a trait:
a) mode and median;
d) variance, standard deviation;
e) correlation coefficient.

(e) All of the above.

8. To estimate the mathematical expectation of the studied parameter in the general population can be used:
(a) Sample mean
b) sampling mode
c) sample median
d) any of the characteristics of the average, depending on the specific task at hand

9. If all values of a trait are divided by 10, the arithmetic mean:
a) will not change;
b) will decrease by 10 times;
c) will increase by 10 times.

10. If all values of a trait are increased (decreased) by some constant value, the variance:
a) will not change;
b) will increase (decrease) by this amount;
c) will decrease (increase) by this amount.

11. If all trait values are increased (decreased) by a factor of 10, the variance:
a) will not change;
b) will increase (decrease) by 10 times;
c) will decrease (increase) by 100 times.

12. For a point estimate of the variation of a trait in the general population can be used:
(a) Sample size
b) Sample variance
c) sample standard deviation
d) corrected sample variance

13. Which observation errors can be calculated using mathematical formulas:
a) random registration errors;
b) systematic registration errors; c)
random representativeness errors;
c) systematic representativeness errors?

14. Representativeness errors occur:
a) only for an infinite general population;
b) only in case of violation of the rules of statistical material collection;
c) always in case of sample observation
d) only for small samples

15. What are the advantages of sampling over continuous observation:
a) it is easier to process the results;
b) saves time, materials, money;

c) gives more accurate results than continuous.
d) allows to reduce the registration error

16. Observance of the principle of randomness when forming the sample population:
a) obligatory;
b) not obligatory;
c) undesirable;
d) depends on the purpose of the study.

17. Which summary measure is called the sample mean:
a) the average value of the trait for the entire population of objects under study;
b) the average value of the trait calculated for the surveyed units of the population;
c) the value of the trait most frequently occurring among the surveyed units of the population;
d) a value chosen by the researcher from some set of values characterizing the average

18. Which summary measure is called the sample fraction:
(a) The number of objects in the sample population possessing the desired property;
b) the percentage of objects possessing the desired property in the sample population;
c) the ratio of the number of objects possessing the desired property in the sample population to the volume of the sample population;
d) the share of units possessing the desired property in the general population

19. How are the limits of possible values of the general average determined:
(a) Sample mean plus (minus) the standard error of the sample mean;
b) sample mean plus (minus) reliability;
c) sample mean plus (minus) sample variance;
d) sample mean plus (minus) the marginal error of the sample mean.

20. The accuracy of interval estimation of the general mean is characterized by
(a) The digit to which the results are rounded;
b) the maximum deviation of the sample mean from the general mean;
c) the probability with which the general average falls within the specified interval;
d) the probability that the estimate is wrong.

21. Select the correct statement(s)
(a) The sample mean provides an estimate of the general mean at a pre-selected confidence level
b) The higher the confidence probability, the wider the estimation interval; the narrower the estimation interval, the smaller the confidence probability.
c) The size of the estimation interval characterizes the accuracy of the estimate, and the confidence probability characterizes the reliability.
d) Confidence probability affects the standard error of the general mean
e) When making an interval estimate, we can only choose in advance the confidence probability, but not the margin of error.

22. It is possible to increase both the accuracy and reliability of interval estimation:
(a) Impossible;
b) it is possible only to estimate the mathematical expectation of the parameter under study
c) can be done by increasing the sample size
d) it is possible if another statistical criterion is applied

23. A statistical hypothesis is:
(a) An assumption that can be tested using available statistical information;
b) an assumption regarding the type or characteristics of the distribution of the studied attribute in the general population;
c) a scientific assumption put forward to explain a phenomenon and requiring verification by experience.

24. A statistical criterion is:
a) a distinctive feature taken as a norm;
b) a function calculated on the basis of sample data, which allows to judge about the correctness of collection of the initial statistical material;
c) a random function calculated on the basis of sample data and a given level of confidence probability, and allows to judge about the correctness of the statistical hypothesis
d) a value that determines the sufficiency of the sample size for the purposes of the statistical study.

25. The power of the criterion represents:
a) the amount of data sufficient to apply the criterion;
b) the ability of the criterion to clearly distinguish between the null and alternative statistical hypotheses;
c) the value that determines the efficiency of applying the criterion to large samples;
d) the probability of not making an error of the 2nd kind when applying the criterion

26. First-order and second-order errors can occur when testing a statistical hypothesis. Select the correct statement(s):
(a) Errors of the first and second kind may occur simultaneously
b) The error of the second kind is the marginal error of estimation of the value of a statistical criterion
c) The second kind of error occurs when an incorrect hypothesis (main or alternative hypothesis) is accepted
d) An error of the first kind can occur when the main hypothesis is discarded

27. An error of the first kind is:
a) acceptance of a statistical hypothesis when it is wrong;
b) rejection of a statistical hypothesis when it is correct;
c) error in establishing the true value of a trait;

d) error in calculating a statistical indicator.

28. An error of the second kind is:
a) acceptance of a statistical hypothesis when it is wrong;
b) rejection of a statistical hypothesis when it is correct;
c) error in establishing the true value of a trait;
d) error in calculating a statistical indicator.

29. The level of significance is:
a) the probability with which the correctness of accepting the main hypothesis is guaranteed;
b) the value of a quantitative indicator or the degree of manifestation of a qualitative indicator;
c) the probability of error in rejecting the correct hypothesis.
d) the value determining the risk of making a wrong decision

30. A more reliable result of a statistical hypothesis test is:
(a) Acceptance of the main hypothesis;
b) rejection of the main hypothesis;
c) both results are equally unreliable.

31. To reduce the probability of the second kind of error, we must:
(a) Reduce the level of significance;
b) increase the level of significance;
c) increase the sample size;
d) it is impossible to reduce the probability of the second kind of error for the chosen criterion

32. Parametric criteria:
(a) These are criteria for testing hypotheses about the parameters of any distribution;
b) these are criteria for testing hypotheses about a parameter-dependent distribution;
c) are used to test hypotheses about the parameters of normal distributions;
d) are used to test hypotheses about the type of distribution.

33. Parametric criteria apply:
a) If the distribution of the quantity under study is close to normal
b) For large samples
c) If the distribution parameters of the general population are known
d) To check the normality of the distribution of the population under study

34. If the correlation coefficient is significantly different from zero, it means:
(a) There is a causal relationship between the quantities under study;
b) one of the quantities is deterministic;
c) there is a linear functional relationship between quantities;
d) there is a linear statistical relationship between the values

35. The LINE function cannot be applied to:
(a) Construction of nonlinear regression equations;
b) testing the statistical validity of the regression equation;
c) determination of Pearson's linear correlation coefficient;
d) construction of a trend of a dynamic series

36. Parametric criteria include:
(a) Fisher's Criterion;
b) Wilcoxon criterion;
c) Chi-square criterion;
d) Mann-Whitney criterion

37. Parametric analysis of variance cannot be used to justify the correct application of parametric analysis of variance:
(a) The central limit theorem;
b) large sample size;
c) chi-square criterion;
d) all of the above can be used

38. The conditions of the central limit theorem are not satisfied for the value:
(a) Waste generation at a particular industrial enterprise per year;
b) the generation of municipal solid waste in a particular city;
c) household waste generation per capita per year;
d) greenhouse gas emissions from landfills

39. A forecast with a given level of reliability for 1 period based on a linear trend can be made:
(a) For normally distributed data only;
b) only for a dynamic series of 100 data or more;
c) when at least 10-12 data are available
d) in the absence of seasonal fluctuations

40. Marginal error when forecasting for 2 or more periods:
(a) No change;
b) increasing
c) decreases;
d) changes uncontrollably

41. Match the statistical research objective to the criterion or type of analysis used:
a) Identify the effect of soil type on pollutant diffusion (2)
b) Find out whether the data conform to the normal distribution law (3)
c) Identify the effect of the amount of mineral matter in the soil on plant growth rate (1)
d) Determine the correctness of the new measurement method (6)
(1) correlation and regression analysis

(2) analysis of variance
(3) chi-square criterion
(4) Fisher's or Mann-Whitney criterion
(5) Student's or Wilcoxon criterion for unrelated samples
(6) Student's or Wilcoxon's criterion for related samples

42. Select the correct statement(s):
a) Analysis of variance is used if the hypothesis of equality of variance of the studied features is confirmed
b) Classical analysis of variance applies only to normally distributed populations
c) Instead of analysis of variance, we can apply pairwise test of equality of mean values
d) Analysis of variance allows to judge about the equality of mean values of different general populations
e) Analysis of variance applies only to samples of equal size

43. In order to apply the Pearson correlation coefficient, it is necessary that:
(a) Both distributions were normal
b) one of the distributions was normal
c) the hypothesis of equality of dispersions of the studied features was confirmed
d) more than 100 pairs of data were available (large samples)
e) there are no special requirements

44. To construct a linear regression equation, it is necessary that:
(a) Both distributions were normal
b) one of the distributions was normal
c) the hypothesis of equality of dispersions of the studied features was confirmed
d) more than 100 pairs of data were available (large samples)
e) there are no special requirements

DEVELOPER:

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