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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

FEDERAL STATE AUTONOMOUS EDUCATIONAL INSTITUTION OF HIGHER EDUCATION

"MOSCOW POLYTECHNIC UNIVERSITY"
(MOSCOW POLYTECHNIC UNIVERSITY)

Faculty of Economics and Management

APPROVED BY
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«27» February 2025

WORKING PROGRAM OF THE DISCIPLINE

«Economic Statistics»

Direction of training/specialty
38.03.01 Economy

Profile/specialization
International business and foreign economic

Qualification
bachelor

Forms of study
full-time

Moscow, 2025

Разработчик(и):

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1. Objectives, tasks and planned learning outcomes for the discipline

The goalmastering the academic discipline "Economic Statistics" is the study the main issues of statistical theory, macroeconomic and microeconomic statistics, the development of skills in conducting statistical calculations and using statistical analysis methods to prepare an economist who meets the requirements of professional standards and the Federal State Educational Standard of Higher Education in the field of 38.03.01 "Economics".

Main**tasks**study of the discipline:

- mastering the most important concepts and provisions of the general theory of statistics in the field collection of primary statistical information, summary and grouping of the obtained primary data and their subsequent processing using statistical analysis methods;

- mastering the methodology of collecting, processing and statistical analysis of data, necessary to solve the economic problems;

- gaining an understanding of the areas of application and developing skills use of the studied methods in the practical activities of an employee of the financial service of the organization.

- study of the most important indicators of social statistics and their methodology calculation.

Training in the discipline "Economic Statistics" is aimed at developing the following competencies in students:

Code and name of competencies	Indicators of Competence Achievement
OPK-2. Capable of collecting, processing and statistically analyzing data necessary to solve the set economic problems	IOPK-2.1. Carries out collection, processing, systematization of statistical information, justifies the choice of sources of information necessary for solving economic problems IOPK-2.2. Selects tools for processing statistical material that correspond to the content of the set economic tasks

2. The place of the discipline in the structure of the educational program

The discipline is a mandatory part of block B1 "Disciplines (modules)". Studying the discipline is based on the following disciplines, passing practical training:

- Economic theory;
- Linear algebra;
- Mathematical analysis;
- World Economy

The basic principles of the discipline should be used in the future studying the following disciplines (practices):

- Econometrics;
- Economy of enterprises and organizations;
- Economy of the industry;
- Finance, money circulation and credit;
- Marketing research;
- Pre-graduation practice.

3. Structure and content of the discipline

The total workload of the course is 4 credit units (144 hours).

3.1 Types of academic work and labor intensity

3.1.1. Full-time education

p/p	Type of academic work	Quantity hours	Semesters 3
1.	**Classroom lessons**	**72**	**72**
	including:		
1.1	Lectures	36	36
1.2	Seminars/practical classes	36	36
1.3	Laboratory exercises	-	-
2.	**Independent work**	**72**	**72**
	including:		
2.1	Preparation for practical classes (study of lecture material)	36	36
2.2	Preparing for testing	18	18
2.3	Solving problems on your own	18	18
	Interim assessment		
	credit/differential credit/exam		**Exam**
	Total	**144**	**144**

3.1.2. Part-time and part-time education

p/p	Type of academic work	Quantity hours	Semesters 4
1.	**Classroom lessons**	**36**	**36**
	including:		
1.1	Lectures	18	18
1.2	Seminars/practical classes	18	18
1.3	Laboratory exercises	-	-
2.	**Independent work**	**108**	**108**
	including:		
2.1	Preparation for practical classes (study of lecture material)	36	36
2.2	Preparing for testing	36	36
2.3	Solving problems on your own	36	36
	Interim assessment		
	credit/differential credit/exam		**Exam**
	Total	**144**	**144**

3.2 Thematic plan for studying the discipline

(by form of education)

3.2.1. Full-time education

p/p	Sections/Topics of the Discipline	Labor intensity, hour					
		Total	Classroom work				Independent Job
			Lectures	Practical classes	Laboratory classes	Practical Preparation	
1.	Subject, method and tasks of statistics. Statistical observation	16	4	-	-	-	12
2.	Classifications and groupings. Statistical indicators	16	4	4	-	-	8
3.	Mean values and variation indices	16	4	6	-	-	6
4.	Statistical methods of relationship analysis	16	4	6	-	-	6
5.	Statistical analysis of time series	16	4	4	-	-	8
6.	Index analysis	16	4	4	-	-	8
7.	Population and labor force statistics. Statistics on staff numbers and time use, productivity and wages	16	4	4	-	-	8
8.	Statistics of the standard of living of the population. Statistics of inflation and prices	16	4	4	-	-	8
9.	Macroeconomic Statistics Indicators. National Wealth Statistics	16	4	4	-	-	8
	Total	**144**	**36**	**36**	**-**	**-**	**72**

3.2.2. Part-time and part-time education

p/p	Sections/Topics of the Discipline	Labor intensity, hour					
		Total	Classroom work				Independent Job
			Lectures	Practical classes	Laboratory classes	Practical Preparation	
1.	Subject, method and tasks of statistics. Statistical observation	16	2	-	-	-	14
2.	Classifications and groupings. Statistical indicators	16	2	2	-	-	12
3.	Mean values and variation indices	16	2	2	-	-	12
4.	Statistical methods of relationship analysis	16	2	4	-	-	10
5.	Statistical analysis of time series	16	2	2	-	-	12
6.	Index analysis	16	2	2	-	-	12

7.	Population and labor force statistics. Statistics on staff numbers and time use, productivity and wages	16	2	2	-	-	12
8.	Statistics of the standard of living of the population. Statistics of inflation and prices	16	2	2	-	-	12
9.	Macroeconomic Statistics Indicators. National Wealth Statistics	16	2	2	-	-	12
	Total	**144**	**18**	**18**	**-**	**-**	**108**

3.3 Contents of the discipline

Topic 1. Subject, method and tasks of statistics. Statistical observation The role and importance of quantitative analysis of mass socio-economic phenomena and processes. The use of statistical analysis for diagnostics of social phenomena. The purpose and objectives of statistics in the system of economic education. The place of the discipline in the educational process and the requirements for the knowledge and skills of a specialist.

The emergence of accounting and statistics. The subject of statistical science. The place of statistics in the system of sciences. The main categories and concepts of statistics. The concept of statistical research. The method of statistics. Statistical measurement. Specificity of statistical methodology and its main stages.

Concept and main stages of statistical observation. Objectives and tasks of statistical observation. Object of observation, unit of observation. Statistical population and its boundaries. Reporting unit. Observation program and criteria of its scientific validity. Statistical form. Organizational forms of statistical observation (reporting, census, register observation). Types of statistical observation (current, periodic, one-time, continuous, sample, by the method of the main array, monographic). Methods of obtaining statistical information (direct observation, documentary method, questionnaire, correspondent survey, self-registration). Statistical observation error (registration error and representativeness error). Statistical control.

Topic 2. Classifications and groupings. Statistical indicators The concept of the classification and grouping method. Statistical groupings and their importance in statistical research. Basic techniques for constructing and implementing groupings. Grouping features (quantitative and qualitative). Simple grouping. Complex grouping (combination and multidimensional). The concept of an interval. Determining the optimal number of groups. Types of groupings (typological, structural and analytical). Statistical table and its elements. Simple, group and combination tables. General rules for compiling statistical tables.

The concept of an absolute indicator. Types of absolute indicators. Natural, cost and labor units of measurement. Instantaneous and interval absolute indicators. Relative indicators and their use in statistics. Typology of relative values. Relative value of structure. Relative value of coordination. Relative values of plan and planned task fulfillment. Relative value of dynamics. Relative values of comparison and intensity.

Topic 3. Average values and variation indices

The concept of average value. The scope of average values in statistical research. Types of average values. Power averages and structural averages. Average

arithmetic and its properties. Harmonic mean. Geometric mean. Square root mean. Methods of calculating average values.

The concept of variation and its statistical study. Absolute variation indices. Relative variation indices and their practical use. Variance of an alternative feature. Variance measures for grouped data: total variance, group and between-group variance. The rule for adding variances.

The concept of distribution patterns. Construction of distribution series. Theoretical distributions in the analysis of variation series. Forms of variation series (ranked, discrete, interval). Finding the mode and median. Discrete series and its features. Interval series. Interval value. Frequencies and particulars. Distribution curves and goodness-of-fit criteria.

Topic 4. Statistical methods of relationship analysis

The concept of statistical relationship. Types and forms of relationships. Partial and multiple correlation. Nonparametric methods for determining the closeness of relationship between quantitative and qualitative characteristics. Calculation methods and measurement limits. Rank correlation coefficient. Association and contingency coefficients. Parametric methods for determining the closeness of relationship. Linear correlation coefficient. Multiple correlation coefficient. Partial correlation coefficients. Regression method for analyzing relationships. Linear and nonlinear, paired and multiple regression.

Topic 5. Statistical analysis of time series

The concept of time series. Basic rules for their construction and use for the analysis of dynamic processes in the economy. Analytical and average indicators of time series. The main tendency of time series (trend) and methods for its detection. Analytical alignment. Studying and measuring seasonal fluctuations. Seasonality indices. Autocorrelation in time series. Autoregressive model. Statistical methods for modeling and forecasting socio-economic phenomena and processes. Interpolation and extrapolation of time series.

Topic 6. Index analysis

The concept of indices. The scope of their application and classification. Individual and general indices. Aggregate index as the main form of the general index. Interrelations of the most important indices. Arithmetic mean and harmonic indices. Index series with constant and variable base of comparison, with variable and constant weights, their interrelations. Index method of analyzing the dynamics of the average level. Indices of variable composition, indices of constant composition, indices of structural shifts. Territorial indices. The importance of indices in the analysis of socio-economic phenomena.

Topic 7. Population and labor force statistics. Statistics on the number of personnel and the use of working time, productivity and wages

Sources of population information. Current population census. Natural population movement indicators. Population migration statistics. Tables for calculating the projected population size. Working-age population. Composition of the economically active population and its distribution by employment status. Employment in the informal sector of the economy. Accounting for and analysis of underemployment. Statistics of labor force and job movements. Methods for calculating labor resources. Unemployment statistics.

Classification of the organization's personnel by categories. Determination of the average headcount of various categories of the organization's personnel. Absolute and relative indicators of personnel dynamics. Funds of personnel working time and the procedure for calculating them. Labor productivity and methods for calculating it.

The concept of remuneration. Forms and systems of remuneration. The wage fund and its composition. Indicators of the average level of remuneration: average hourly, average daily and average monthly (annual) remuneration. Study of the dynamics of the average level of remuneration.

Topic 8. Statistics of the standard of living of the population. Statistics of inflation and prices

Statistical methods of studying the standard of living of the population. The importance of statistical study of population income. Indicators of differentiation of population income. Analysis of factors influencing the distribution of population income. Total income. Nominal and real income. Balance of monetary income and expenditure of the population. Poverty statistics indicators. Statistical indicators of the volume, structure and level of consumption of material goods and services. Methods of consumer demand analysis. Indicators of consumption dynamics. Cost of living index.

Inflation and its statistical study. Socio-economic essence of price. System of collecting information on prices. System of price statistics indicators. Consumer price index. Producer price indices. Statistical indicators of price dynamics. Statistics of consumer market prices.

Topic 9. Macroeconomic statistics indicators. National wealth statistics

The concept and content of the system of national accounts and general principles of their construction. Consolidated accounts of the domestic economy of the SNA. The system of indicators of economic performance in the SNA. The system of macroeconomic calculations of gross domestic product (GDP) and national income (NI). Calculation of indicators of gross fixed capital formation. Calculation of changes in stocks of working capital. Methods for calculating GDP and NI.

The concept and composition of national wealth. The system of indicators of national wealth statistics. Determining the volume of national wealth. Statistics of fixed capital and fixed assets. Revaluation of fixed assets. Statistics of circulating assets.

3.4 Topics of seminars/practical and laboratory classes

3.4.1. Seminars/practical classes

Topic 2. Solving problems on constructing statistical grouping and calculating relative values of different types

Topic 3. Solving problems on calculating average values and variation indices

Topic 4. Solving problems on calculating correlation indices

Topic 5. Solving problems on the analysis of dynamic series Topic 6.

Solving problems on the calculation of indices

Topic 7. Solving problems on employment and unemployment statistics, determining the economically active and working-age population, the number of personnel and the use of working time, productivity and wages

Topic 8. Solving problems on statistics of the standard of living of the population, statistics of inflation and prices

Topic 9. Solving problems on statistics of fixed and working capital and calculation of macroeconomic indicators

3.4.2. Laboratory exercises

Laboratory classes for this discipline are not provided for in the curriculum.

3.5 Topics of course projects (course papers)

The curriculum does not provide for a course project (course work) for this discipline.

4. Educational, methodological and informational support

4.1 Regulatory documents and GOSTs

Regulatory documents and GOSTs are not used when studying the discipline.

4.2 Main literature

1. Statistics: a textbook for universities / I. I. Eliseeva [et al.]; editor-in-chief I. I. Eliseeva. - 6th ed., revised and enlarged. - Moscow: Yurait Publishing House, 2023. - 619 p. - (Higher education). - ISBN 978-5-534-15117-6. - Text: electronic // Yurait Educational Platform [website]. - URL: https://urait.ru/bcode/517575 (accessed: 02/16/2023).

2. Dudin, M. N. Statistics: textbook and workshop for universities / M. N. Dudin, N. V. Lyasnikov, M. L. Lezina. - Moscow: Yurait Publishing House, 2023. - 374 p. - (Higher education). - ISBN 978-5-9916-8908-3. - Text: electronic // Educational platform Yurait [website]. - URL: https://urait.ru/bcode/512310 (date of access: 02/16/2023).

3. Dolgova, V. N. Statistics: textbook and practical training for universities / V. N. Dolgova, T. Yu. Medvedeva. - 3rd ed., revised and enlarged. - Moscow: Yurait Publishing House, 2023. - 564 p. - (Higher education). - ISBN 978-5-534-16050-5. - Text: electronic // Yurait Educational Platform [website]. - URL: https://urait.ru/bcode/530349 (date of access: 02/16/2023).

4.3 Further reading

1. Yakovlev, V. B. Statistics. Calculations in Microsoft Excel: a tutorial for universities / V. B. Yakovlev. - 2nd ed., corrected and additional. - Moscow: Yurait Publishing House, 2023. - 353 p. - (Higher education). - ISBN 978-5-534-01672-7. - Text: electronic // Yurait Educational Platform [website]. - URL: https://urait.ru/bcode/514005 (date of access: 02/16/2023).

2. Bychkova, S. G. Socio-economic statistics: textbook and practical training for universities / S. G. Bychkova, L. S. Parshintseva; under the general editorship of S. G. Bychkova. - Moscow: Publishing house Yurait, 2023. - 488 p. - (Higher education). - ISBN 978-5-534-14952-4. - Text: electronic // Educational platform Yurait [website]. - URL: https://urait.ru/bcode/519922 (date of access: 02/16/2023).

3. Shimko, P. D. Theory of statistics: textbook and practical training for universities / P. D. Shimko. — Moscow: Yurait Publishing House, 2023. — 254 p. — (Higher education). — ISBN 978-5-9916-9066-9. — Text: electronic // Yurait Educational Platform [website]. — URL: https://urait.ru/bcode/511892 (date accessed: 02/16/2023).

4.4 Electronic educational resources

Electronic educational resource for the discipline "Economic Statistics":

https://online.mospolytech.ru/course/view.php?id=10050

4.5 Additional electronic educational resources

1. Online course on the subject "Statistics" of the Moscow Polytechnic University (author– Dmitrieva O.V.).– URL: https://online.mospolytech.ru/course/view.php?id=672 (date accessed: 16.02.2023).

2. Online course "Quantitative Methods of Economic Analysis" of the platform "Open "Education". - URL:https://openedu.ru/course/hse/QUANEC/?session=2022 (date accessed: 16.02.2023). –Access mode: free.

4.6 Licensed and freely distributed software security

1. Microsoft Office suite programs (Word, Excel, PowerPoint)

4.7 Modern professional databases and information reference systems

1. SPS "ConsultantPlus: Non-commercial Internet version". - URL: http://www.consultant.ru/online/ (date accessed: 16.02.2023). –Access mode: free.

5. Logistics

1. Lecture hall.
2. Auditorium for practical classes.
3. Computer class with Internet access.
4. Audience for group and individual consultations, ongoing monitoring and midterm assessment.
5. Audience for independent work.
6. Library, reading room.

6. Methodological recommendations

6.1 Methodological recommendations for the teacher on the organization training

This section of this work program is intended for beginning teachers and practicing specialists who do not have teaching experience.

The discipline "Economic Statistics" forms the competence of OPK-2 in students. In the context of constructing educational systems on the principles of the competence approach, there has been a conceptual change in the role of the teacher, who, along with the traditional role of the knowledge carrier, performs the function of the organizer of the student's scientific research work, a consultant in the procedures for selecting, processing and interpreting information necessary for practical action and further development, which must be taken into account when conducting lectures and practical classes in the discipline "Economic Statistics".

Teaching theoretical (lecture) material By discipline "Economic Statistics" is implemented on the basis of interdisciplinary integration and clear interdisciplinary links within the educational program and curriculum.

The detailed content of individual topics of the discipline "Economic Statistics" is considered in paragraph 3.3 of the work program.

Sample versions of tasks and test assignments for current monitoring and a list of questions for the exam in the discipline are presented in the FOS for the discipline in paragraph 7 of this work program.

The list of primary and secondary literature, databases and information reference systems required during the teaching of the discipline “Economic Statistics” is given in paragraph 4 of this work program.

6.2 Methodological instructions for students on mastering the discipline

Acquiring in-depth knowledge of the discipline is achieved through active independent work of students. It is advisable to use the allocated hours to get acquainted with educational and scientific literature on the problems of the discipline, and to analyze scientific concepts.

The discipline provides for various forms of monitoring the level of achievement by students of the stated indicators of mastery of competencies.

Forms of ongoing control – active work in practical classes, testing.

The form of intermediate control in the discipline is an exam, during which the level of achievement of the stated indicators of mastery of competencies by students is assessed.

Methodological guidelines for mastering the discipline.

Lecture classes are conducted in accordance with the content of this work program and represent a presentation of the theoretical foundations of the discipline.

Attendance at lectures is mandatory.

Taking notes on lecture material is permitted both in writing and on a computer.

Regular repetition of the material of lecture notes for each section in preparation for the current forms of certification in the discipline is one of the most important types of independent work of the student during the semester, necessary for high-quality preparation for the midterm certification in the discipline.

Conductingpractical classes in the discipline "Economic Statistics" is carried out in the following forms:

- survey on materials discussed in lectures and studied independently recommended literature;
- analysis and discussion of issues on topics, problem solving.

Attendance at practical classes and active participation in them is mandatory.

Preparation for practical classes necessarily includes studying lecture notes and recommended literature for an adequate understanding of the conditions and method of completing the tasks planned by the teacher for a specific practical class.

Methodological guidelines for the implementation of various forms of extracurricular independent work

Study of primary and secondary literature on the discipline is conducted on a regular basis in the context of each topic to prepare for the midterm assessment in the discipline "Economic Statistics". The list of primary and secondary literature on the discipline is given in paragraph 4 of this work program.

Guidelines for preparation for midterm assessment The midterm assessment in the discipline "Economic Statistics" is conducted in the form of an exam. An approximate list of questions for the exam in the discipline "Economic Statistics" and the criteria for assessing the student's answer for the purposes of assessing the achievement of the stated indicators of competence formation are provided in the FOS for the discipline in paragraph 7 of this work program.

The student is admitted to the midterm assessment in the discipline regardless of the results of the current academic performance monitoring.

7. Evaluation Fund

7.1 Methods of monitoring and assessing learning outcomes

Code and name competencies	Achievement indicators competencies	Control methods and evaluation
OPK-2. Capable realize collection, processing And statistical analysis data necessary to solve the problems economic tasks	IOPK-2.1. Carries out collection, processing, systematization of statistical information, substantiates the choice of sources of information necessary for solving economic problems IOPK-2.2. Selects tools for processing statistical material corresponding to the content of the set economic problems	Intermediate certification: exam Current control: survey and decision tasks on practical classes; testing

7.2 Scale and criteria for assessing learning outcomes

7.2.1. Criteria for assessing the answer to the exam
(formation of the competence of the OPK-2, indicators of the IOPK-2.1, IOPK-2.2)

"5" (excellent):the student demonstrates excellent theoretical knowledge, practical skills, knows the terms, makes reasoned conclusions and generalizations, gives examples, demonstrates fluency in monologue speech and the ability to quickly respond to clarifying questions.

"4" (good):the student demonstrates good theoretical knowledge, practical skills, knows the terms, makes reasoned conclusions and generalizations, gives examples, demonstrates fluency in monologue speech, but at the same time makes minor mistakes that he quickly corrects independently or with minor correction from the teacher.

"3" (satisfactory):the student demonstrates satisfactory theoretical knowledge, demonstrates poorly developed skills in analyzing phenomena and processes, insufficient ability to make reasoned conclusions and give examples, demonstrates insufficient fluency in monologue speech, terms, logic and consistency of presentation, makes mistakes that can only be corrected with correction from the teacher.

"2" (unsatisfactory):the student demonstrates ignorance of theoretical fundamentals of the subject, lack of practical skills, cannot make reasoned conclusions and give examples, demonstrates poor command of monologue speech, does not know the terms, demonstrates a lack of logic and consistency in presentation, makes mistakes that cannot be corrected by the teacher, refuses to answer additional questions.

7.2.2. Criteria for assessing the student's work in practical classes (formation of the competence of the OPK-2, indicators of the IOPK-2.1, IOPK-2.2)

"5" (excellent):all tasks provided for in the practical plan have been completed classes, the student answered all test questions clearly and without errors, and worked actively in practical classes.

"4" (good):all tasks provided for in the practical plan have been completed classes, the student answered all the test questions with corrective comments from the teacher and worked quite actively in practical classes.

"3" (satisfactory):all tasks provided for in the plan have been completed practical classes, with comments from the teacher; the student answered all test questions with comments.

"2" (unsatisfactory):the student did not complete it or completed it incorrectly practical tasks provided for in the practical lesson plan; the student answered the test questions with errors or did not answer the test questions.

7.2.3. Test results evaluation criteria (development of the OPK-2 competence, indicators IOPK-2.1, IOPK-2.2) Testing is assessed in accordance with the percentage of correct answers given by the student to the test questions.

Standard scale of compliance of test results with the assigned score:

- "excellent" - over 85% correct answers; "good" - from
- 70.1% to 85% correct answers; "satisfactory" - from 55.1%
- to 70% correct answers; from 0 to 55% correct answers -
- "unsatisfactory"

"5" (excellent):the test taker demonstrates excellent theoretical knowledge, has terms and has the ability to quickly respond to test questions.

"4" (good):the test taker demonstrates good theoretical knowledge, has most terms and has the ability to quickly respond to test questions.

"3" (satisfactory):the test taker demonstrates satisfactory theoretical knowledge, has a command of basic terms and concepts.

"2" (unsatisfactory):the test taker lacks theoretical knowledge, He doesn't know the terminology and responds slowly to test questions.

7.3 Evaluation tools

7.3.1. Current control

(formation of the competence of the OPK-2, indicators of the IOPK-2.1, IOPK-2.2)

Examples of problems to be solved in practical classes:

1. Represent the following distributions as a discrete series:
statistical data on the wage grade of workers at printing company No.:

4 6 5 2 3 5 5 5 5 4 5 2 3 2 3 2 3 4 3 2 1 2 4 4 5 4 6 4 3 3
6 2 6 4 3 4 5 2 5 1 4 5 5 1 6 1 6 3 1 5 4 5 6 3 4 3 5 2 5 4
3 1 6

2. Using the data presented in the table, analyze with
relative values of coordination of the ratio of the number of people employed in enterprises and organizations of the state and non-state sectors of the economy of state C in 20XX.

Table

Employment data for state C in 20XX

Indicators	Number of employed, million people
Total employed in the economy, including:	63.8
at enterprises and in public sector organizations	25.9
in the private sector	24.8
in public organizations and funds	0.4
in joint ventures	0.9
in enterprises with mixed ownership	11.8

3. There is the following distribution of employees of enterprise A by length of service (table):

Table

Distribution of employees of enterprise A by length of service

Work experience, years	Number of employees	
	Men	Women
1	10	5
3	12	7
5	28	8
6	20	9
8	20	16
10	12	20
11	5	15
12	3	10
Total	110	90

Determine the average length of service:

- men;
- women.

4. Results of fulfilling the shift production standard of the printing shop workers have the following form (in percent): 121, 126, 123, 118, 120, 124, 127, 125, 140, 128, 110, 115, 118, 120, 150, 130, 132, 116, 127, 130.

Based on the above data, determine:

- range of variation;
- mean linear deviation; standard
- deviation.

5. The following data are available on the graduation of specialists from higher educational institutions: establishments:

Table

Graduation of specialists from higher education institutions in 2018-2022

	2018	2019	2020	2021	2022
Number specialists, thousand people	200	202	205	206	207

To analyze the dynamics of graduates from higher education institutions, determine:

1. Average level of the row.
2. Absolute increases (chain and base).
3. Growth and increment rates (chain and base).

6. Volume of passenger transportation by the motor transport enterprise for the period from 2010 increased by 1.22 times from 2010 to 2014, and by 32.5% for the period from 2014 to 2016. Determine for the period from 2010 to 2016:

- growth rate of passenger traffic; average
- annual growth rate of traffic volume.

7. Determine the average change in prices of goods if the cost index turnover amounted to 103.4%, and the volume of products sold increased by 15.1%.

8. The following data on prices and output of printed materials were obtained in Printing houses B (table):

Table

Prices and production of printed products in the printing house B

Categories qualities	Price per unit, USD		Output, thousand units	
	Basic period	Reporting period	Basic period	Reporting period
Highest	1.5	1.6	100	140
First	1,2	1,1	120	300

Based on the available data, calculate the average price indices for printed products:

- variable composition;
- fixed composition;
- structural shifts.

Examples of test tasks:

1. Change in the value of a feature when moving from one unit of a population to another:

A) totality
B) indicator
C) variation
D) regularity

2. The preliminary stage of statistical research, which is scientific organized collection of primary data on mass socio-economic phenomena and processes:

A) observation
B) grouping
C) summary
D) information analysis

3. Observation repeated at regular intervals with the purpose of determining the size and composition of a population:

A) reporting
B) census
C) survey
D) register
E) random observation

4. Research of passenger flows in public transport – example ..... observations:

A) periodic
B) one-time
C) continuous
D) current

5. Violation of the principle of selection of units from the original population is characterized by:
A) random registration errors
B) systematic registration errors
C) random errors of representativeness
D) systematic errors of representativeness

6. Generalization of mass statistical material cancels out:
A) random registration errors
B) systematic registration errors
C) random errors of representativeness
D) systematic errors of representativeness

7. Distribution of the set of units of the studied population into groups in in accordance with the essential feature for this group:
A) summary
B) classification
C) grouping
D) segmentation

8. Sturgess' formula for determining the optimal number of groups when constructing combination grouping has the form:
A) n-1- 3,322- lg$N$
B) n-1- 3,322- lg$N$
C) n-3,322-lg$N$
D) n-3,322-lg$N$-1

9. The value of the equal interval for a pre-known number of groups is determined according to the formula:
A) i- $\frac{X_{max}- X_{min}}{n}$
B) n-1- 3,322- lg$N$
C) i- $\frac{X_{max}- X_{min}}{1- 3,322- \lg N}$
D) i--X_{max}-X_{min}--n
E) i--X_{max}-X_{min}---3,322-lg$N$-1-

10. Grouping of population by income – example of ..... grouping:
A) typological
B) structural
C) analytical
D) variational

11. An interval that has only one boundary is the ### interval.

12. An interval that has upper and lower boundaries is the ### interval.

13. A product that has several varieties is converted into a conditional product and expressed using ..... units of measurement:

A) natural
B) conditionally natural
C) cost
D) labor

14. The specific weight of individual parts in the total volume of the aggregate characterizes relative value:

A) structures
B) coordination
C) intensity
D) planned task
E) implementation of the plan
F) speakers
G) comparisons

15. The change in the volume of the same phenomenon over time characterizes relative value:

A) structures
B) coordination
C) intensity
D) planned task
E) implementation of the plan
F) speakers
G) comparisons

16. Formula $\bar{x} = \frac{\sum x}{n}$ is used to calculate the average:

A) arithmetic weighted
B) harmonic
C) arithmetic simple
D) geometric
E) quadratic

17. Formula $\bar{x} = \frac{\sum xf}{\sum f}$ is used to calculate the average:

A) arithmetic weighted
B) harmonic
C) arithmetic simple
D) geometric
E) quadratic

18. Multiplication of individual values of a variable feature by a constant value - arithmetic mean:

A) does not change
B) increases by - times
C) decreases by - times

D) increases by the amount -
E) decreases by the amount -

19. Formula $\frac{\sum (x - \bar{x})^2 f}{\sum f}$ used to calculate:

A) range of variation
B) dispersion
C) mean linear deviation
D) linear coefficient of variation
E) oscillation coefficient

20. Relative variation indices:
A) dispersion
B) standard deviation
C) coefficient of variation
D) range of variation
E) oscillation coefficient

21. The most frequently occurring meaning of the units of the population:
A) dispersion
B) fashion
C) median
D) arithmetic mean

22. The median of an interval series is determined by the formula:

A) $Me = x_0 + h \frac{\frac{\sum f}{2} - S_{m-1}}{f_m}$

B) $Me = x_0 - h \frac{\frac{\sum f}{2} - S_{m-1}}{f_m}$

C) $Me = x_0 + \frac{\frac{\sum f}{2} - S_{m-1}}{f_m}$

D) $Me = x_0 + h \frac{\frac{\sum f}{2} - S_{m-1}}{f_m}$

23. The value of the mode of the variation series:

x	1	2	3	4	5	6	7
f	8	10	12	14	10	8	4

24. The value of the median of the variation series:
1, 2, 3, 3, 6, 7, 9, 9, 10

25. Reduction of the resultant feature ***at*** with an increase in the factor indicator ***X*** without any isolated exceptions indicates the presence of ..... connection:
A) full straight line
B) full reverse
C) partial straight line

D) partial feedback

26. The meaning of the linear correlation coefficient r=0.967 indicates the presence of ..... connections:

A) weak straight line
B) close straight
C) weak feedback
D) close feedback

27. The meaning of the linear correlation coefficient r=-0.956 indicates the presence of ..... connections:

A) weak straight line
B) close straight
C) weak feedback
D) close feedback

28. The ratio of the current level to the level taken as the basis for comparison:
A) absolute increase
B) growth rate
C) growth rate
D) the absolute value of one percent increase

29. The ratio of absolute growth to the corresponding growth rate:
A) absolute increase
B) growth rate
C) growth rate
D) the absolute value of one percent increase

30. Formula x-T_p-100% is used to calculate:
A) absolute growth
B) growth rate
C) growth rate
D) the absolute value of one percent increase

7.3.2. Interim assessment

(formation of the competence of the OPK-2, indicators of the IOPK-2.1, IOPK-2.2)

1. Statistics as a science. Basic concepts of statistics.
2. Statistical research and its main stages.
3. Statistical observation: concept and requirements for it organizations
4. Preparation of statistical observation: the essence and content of the
5. work Classification of statistical observation by form
6. Classification of statistical observation by types
7. Classification of statistical observation by the method of obtaining statistical information
8. Control of the obtained primary data during statistical analysis observations
9. Control of the obtained primary data during statistical analysis observations

10. Methodology for constructing a statistical grouping with equal and unequal intervals
11. Absolute indicators in statistics: essence and calculation
12. Relative quantities in statistics: types and methods of calculation
13. Average values in statistics: essence and types
14. Arithmetic means: types and methods of calculation
15. Properties of the arithmetic mean
16. Average of interval series and its calculation
17. Power means: types and methods of calculation
18. Mode and its calculation in interval and discrete series
19. Median and its calculation in interval and discrete series
20. Analysis of variation: applied indicators and their calculation
21. Properties of dispersion
22. Functional and correlational relationships in statistics
23. Classification of types of communication in statistics
24. Correlation and regression analysis: least squares method and construction of a system of normal equations for linear functions
25. Linear correlation coefficient: essence and calculation
26. Correlation index: essence and calculation
27. Fechner coefficient: essence and calculation
28. Kendall coefficient: essence and calculation
29. Spearman coefficient: essence and calculation
30. Dynamic series in statistics: concept and types
31. Average values of dynamic series: types and methods of calculation
32. Indicators of dynamic series analysis: series level, absolute increase and rate of increase
33. Dynamic series analysis indicators: growth rate and absolute value one percent increase
34. Interpolation: concept and methods of its implementation
35. Extrapolation: concept and methods of its implementation
36. Analytical smoothing of time series
37. Indicators of oscillation of levels of dynamic series
38. Indices in statistics: concept and types
39. Indexes with constant and variable weights, chain and base indices: essence and calculus
40. Variable and fixed indexes: essence and calculation
41. Interrelation of indices and factor analysis
42. National wealth: essence and procedure for its calculation
43. Fixed assets as an element of national wealth: concept and types valuation
44. Depreciation of fixed assets as an economic category. Methods depreciation accruals
45. Indicators of movement and condition of fixed assets of the organization: types and the order of their calculation
46. Indicators of the use of fixed assets of the organization: types and order of their calculation
47. Material working capital as an element of national wealth: concept and classification
48. Indicators of the efficiency of the use of working capital: types and procedure for their calculation
49. Key population indicators and the procedure for their calculation

50. Natural population movement: concept and estimated indicators
51. Mechanical movement of population: concept and evaluation indicators
52. Relative indicators of population migration: types and procedure for their calculation
53. Labor resources: concept and composition
54. Employed population and its classification
55. Unemployed population and its classification. Statistical analysis of the level unemployment
56. Unemployment and its types
57. Statistical accounting of unemployment losses
58. Underemployment: concept and types
59. Standard of living of the population: concept and types. Socio-economic standard of living indicator
60. Population income. The concept of nominal and disposable household income farms
61. Indicators of differentiation of monetary incomes of the population: types and order of their calculus
62. Statistical indicators of consumption of material goods and services by the population
63. Inflation: concept, types and methods of its statistical study
64. System of price statistics indicators
65. Classification of types of economic production in the SNA
66. Sectors of the economy in the SNA: concept and classification
67. The most important macroeconomic indicators of the SNA
68. Production method of calculating GDP and GNI
69. Distribution method of calculating GDP and GNI
70. Calculation of GDP and GNI at the final consumption stage
71. Statistical indicators of the use of labor resources of the organization
72. Statistical analysis of working time use
73. Labor force movement: concept and applied assessment indicators
74. Statistics of wages: the most important indicators and methods of their calculation
75. Statistical analysis of labor productivity