



## ***Сматематика / Statistics***

### **Syllabus of the course**

Specialty	38.03.02 Management
Specialization	Business management and digital innovations
Level of higher education	Bachelor
Form of training	Full-time
Year of enrolment	2022
Authored by:	
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Total number of hours	108	<b>Form of final attestation:</b>  Test: semester 3
incl:		
contact work	32	
self-study	76	
practical training	0	
control hours	0	

#### **Hours distribution:**

Semester:	3
Type of classes	Hours
Contact hours	18
Practical training	14
Laboratory work	
<b>Total contact hours</b>	32
Self-study	76
Control hours	0
<b>Total academic hours</b>	108
<b>Total credits</b>	3

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## 1. LEARNING OBJECTIVES

<b>Objective:</b>	Familiarization of students with the main statistical categories, methods of collecting, processing and analyzing mass socio-economic phenomena, taking into account their interconnectedness, dynamism and spatial variation.
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## 2. COURSE PLACE IN THE PROGRAMME STRUCTURE

The discipline B1.O Statistics is a part of Block 1.

## 3. EXPECTED LEARNING OUTCOMES

Code and name of graduate competence	Code and name of the competence achievement indicator	Expected learning outcomes
GPC-2 – Able to collect, process and analyze the data necessary to solve the assigned management tasks, using modern tools and intelligent information and analytical systems	GPC-2.2 – Applies the methods of collecting, processing and analyzing data necessary to solve the assigned management tasks, using modern digital technologies, perceives, analyzes, remembers and transmits information using digital means, as well as using algorithms when working with data obtained from various data sources	<p>To know: the main categories of statistics: statistical population, statistical regularity, population unit, attribute, indicator, system of statistical indicators. The content of the main methods of statistical analysis: descriptive statistics; selective observation and determination of the boundaries of confidence intervals, testing of statistical hypotheses, measurement of stochastic relationships, index analysis; principles of construction and processing of time series</p> <p>To be able to: use sources of economic, social, management information (statistical collections and yearbooks, website data, public financial statements) to conduct statistical research</p> <p>To possess: skills and methods for calculating the main statistical indicators of relative and average values, variation indicators, sampling errors and boundaries of confidence intervals, correlation indicators (empirical correlation ratio, correlation coefficients for quantitative and non-quantitative characteristics), indices, dynamics indicators</p>

## 4. COURSE STRUCTURE AND CONTENT

Code and name of the topics	Course content	Academic hours			
		Contact work			Self-study
		Lectures	Practices	Workshops	
Topic 1. Subject, method, tasks and	Definition of statistics as a science. Types of accounting, features of statistical accounting. Tasks of	2	1		6

organization of statistics in the Russian Federation.	statistics at micro- and macrolevels. State and departmental statistics. Reforming the state statistics of Russia. Sources of statistical information. The concept of statistical regularity and the law of large numbers. Statistical population (general, private), population units. Signs of a population unit.				
Topic 2. Stages of statistical research.	The main stages of statistical research - observation, grouping, summary. The concept and forms of statistical observation; types of observation according to the degree of coverage of units of the population, according to the frequency of conducting, according to the methods of obtaining information. Requirements for statistical data. The concept of observation errors, ways to identify them. Tasks and types of statistical groupings. Typological, structural and analytical groupings. Groupings are simple, combinational, multidimensional. Tasks and order of the summary. The concept of an indicator; principles of formation of general and particular systems of indicators characterizing socio-economic processes and phenomena. Absolute and relative statistical indicators. Visualization of statistical information. Rules for the design of statistical tables and graphs.	2	1		8
Topic 3. Descriptive characteristics of the study population: average values, indicators of variation, analysis of structural changes and differences.	Descriptive statistics. Essence and meaning of average values. Types, shapes of averages, general rules for constructing averages. Majority property. Simple and weighted average; feature selection rule - weight. Mathematical properties of the arithmetic mean. Average reliability conditions. The role of average and relative values in economic and statistical analysis. The concept and objectives of the study of variation. Distribution series, their types, construction rules, graphic representation. Absolute and relative indicators of the size and intensity of variation. Range of variation, mean linear and standard deviation, variance, coefficient of variation. Structural distribution characteristics: mode, median, deciles, quartiles, etc. Their analytical significance, examples of practical use. Indicators of the form of distribution - asymmetry and kurtosis. Analysis of changes in the structure of the population. Generalizing indicators of structural shifts (differences).	4	4		14
Topic 4. Selective observation.	Significance and features of selective observation in statistical research. Reasons for using sample observations. The concept of sample and general population, types of sample observations; selection methods. Determination of sampling error, factors influencing the size of the average and marginal sampling error. Methodology for determining the required sample size at the stage of preparing a sample observation. Determining the probability of acceptable sampling error. Extending sample observation data to the general population: determining the boundaries of confidence intervals for the general average and the general proportion. Examples of the use of sample observations in Russian government statistics, in the marketing activities of firms, public opinion polls, etc.	2	2		12
Topic 5. Measuring relationships.	The concept of functional, stochastic and correlation. Methods for measuring stochastic relationships.	3	2		12

Application of correlation-regression analysis.	Measuring relationships based on analytical grouping. Empirical correlation relation. Determination coefficient. Problems of correlation analysis and regression modeling. Pair correlation. Paired linear regression. Evaluation of the relationship of non-quantitative variables based on association coefficients, contingency, rank correlation coefficients.				
Topic 6. Index method of analysis.	The concept of indices, their tasks. Types of indices depending on the level of generalization, the nature of the tasks being solved, and the construction methods. aggregate indexes. Average indexes. Index analysis of changes in the weighted average value, the analytical value of the indices of variable, constant composition, structural shifts. Examples of the use of indices in domestic statistics. Features of constructing indexes calculated by the method of Laspeyres, Paasche, Fisher.	2	2		12
Topic 7. Statistical study of dynamics.	The concept and tasks of studying dynamic series, their types. Dynamic series elements, main components of the dynamic series level. Principles of constructing dynamic series: the concept of a system of dynamic series; ensuring comparability of time series. Graphic representation of time series and their systems. The problem of periodization of the series of dynamics, the procedure for its implementation. Indicators of series of dynamics (chain, basic). Methodology for calculating average indicators of dynamics, their analytical value. The concept of extrapolation and interpolation. Techniques for identifying trends in the series of dynamics; tasks and methods for studying seasonality; time series forecasting.	3	2		12
<b>Control hours:</b>					<b>0</b>
<b>Total hours:</b>		<b>18</b>	<b>14</b>	<b>0</b>	<b>76</b>

## 5. TEACHING AND LEARNING TOOLS OF THE COURSE

### 5.1 Recommended literature

Bibliographic description of the publication (author, title, type, place and year of publication, number of pages)	Digital resources
Statistics: textbook for applied bachelor's degree / [Bochenina M.V. and etc.] ; ed. I.I. Eliseeva; St. Petersburg. state economy un-t. 4th ed., revised. and additional Moscow: Yurayt, 2020. 447 p. : ill., tab. (Bachelor. Applied course). ISBN 978-5-9916-3312-3.	<a href="https://urait.ru/viewer/statistika-468415#page/1">https://urait.ru/viewer/statistika-468415#page/1</a>
Eliseeva, Irina Ilyinichna. Business statistics: Textbook and workshop for universities / ed. Eliseeva I.I. Moscow: Yurayt, 2021. 411 p.	<a href="https://urait.ru/bcode/470024">https://urait.ru/bcode/470024</a>

### 5.2 List of software (including national production)

- 7-Zip
- LibreOffice
- ОС АЛТ образование 10

- Project Libre (open source)

### 5.3 List of reference systems and modern professional databases

№	Name of reference systems and professional databases
1.	Digital library Grebennikon.ru – <a href="http://www.grebennikon.ru">www.grebennikon.ru</a>
2.	Science Digital Library eLIBRARY – <a href="http://www.elibrary.ru">www.elibrary.ru</a>
3.	Science Digital Library КиберЛеника – <a href="http://www.cyberleninka.ru">www.cyberleninka.ru</a>
4.	Database ПОЛПРЕД Справочники – <a href="http://www.polpred.com">www.polpred.com</a>
5.	Database OECD Books, Papers & Statistics on the platform OECD iLibrary <a href="http://www.oecd-ilibrary.org">www.oecd-ilibrary.org</a>
6.	Legal reference system КонсультантПлюс (installed resource UNECON or <a href="http://www.consultant.ru">www.consultant.ru</a> )
7.	Legal reference system «ГАРАНТ» (installed resource UNECON or <a href="http://www.garant.ru">www.garant.ru</a> )
8.	Information and referral system «Кодекс» (installed resource UNECON or <a href="http://www.kodeks.ru">www.kodeks.ru</a> )
9.	Digital library system BOOK.ru - <a href="http://www.book.ru">www.book.ru</a>
10.	Digital library system ЭБС ЮРАЙТ – <a href="http://www.urait.ru">www.urait.ru</a>
11.	Digital library system ЗНАНИУМ (ZNANIUM) – <a href="http://www.znanium.com">www.znanium.com</a>
12.	Digital library UNECON – <a href="http://opac.unecon.ru">opac.unecon.ru</a>

## 6. TECHNICAL FACILITIES

There are special rooms for lectures, seminars, coursework, group and individual consultations, current and interim assessments, as well as rooms for self-study.

The premises are equipped with equipment and teaching aids.

The rooms for students' independent work are equipped with computers with Internet connection and access to the university's electronic learning environment.

Name of classroom	Classroom location
Classroom 3035 Training classroom (for conducting lecture-type classes and seminar-type classes, course design (term papers), group and individual consultations, current control and intermediate certification), equipped with a multimedia complex. Specialized furniture and equipment: Educational furniture for 128 seats ( desks 32 pcs - 4 local), teacher's workplace, chalk board (3-section) 2 pcs, pulpit 1 pc, computer table m/m 1 pc, table 2 pcs, chair 2 pcs. Computer Intel i3-2100 2.4 Ghz/500/4/Acer V193 19", Projector NEC NP-P501X included : VGA-VGA cable Kramer 15m15m length 15 m Amplifier distributor VGA signal Kramer VP-222K cable Greenconnect Jack 3.5 mm/RCA 2 length 3 m - 1 pc., Mixer-amplifier JDM TA-1120 complete with microphone cable Tasker c114 black in 100m coil Microphone BEHRINGER XM8500 Acoustic cable Tasker C121 in 100m coil - 1 pc. -4306) - 1 pc., Acoustic system APart MASK6T color white - 2 pcs. Sets of demonstration equipment and teaching and visual aids: multimedia applications for lecture courses and practical exercises, interactive teaching and visual aids.	191023, St. Petersburg, Griboedova canal, 30-32, lit. A, B, P
Classroom 3024 Laboratory of the Department of Banks, Financial Markets and Insurance. Specialized furniture and equipment: Educational furniture for 26 seats (13 tables, 26 chairs), teacher's workplace, marker board on wheels 1, table 1, chair 1, book 3 cabinets, 3 bookcases with mezzanines, 2 cabinets, 1 rack hanger, 1 bulletin board. IP Cisco IP Phone 7911G - 1 pc. Portable multimedia kit: Notebook HP 250 G6 1WY58EA, Multimedia projector LG	191023, St. Petersburg, Griboedova canal, 30-32, lit. A, B, P

PF1500G. Sets of demonstration equipment and visual aids: multimedia applications for lecture courses and practical exercises, interactive educational visual aids.	
Classroom 2034 Computer room (for practical classes, course design (coursework) using computer technology), equipped with a multimedia system. Specialized furniture and equipment: Educational furniture for 25 seats, teacher's workplace (table 1pc., chair 1pc.), marker board 1pc, Rack hanger 2pcs, chairs 3pcs.Computer I5-7400/8Gb/1Tb/DELL S2218H - 21pcs, Network switch Cisco WS-C2960-48TT-L (Catalyst2960) 48-ports 10/100Mbps+2p - 1 pc, Switchboard Cisco Catalyst 2960 24 WS-C2960-24PC-L - 1 pc. Sets of display equipment and visual aids: multimedia applications for lecture courses and practical sessions, interactive teaching and visual aids.	191023, St. Petersburg, Griboedova canal, 30-32, lit. A, B, P

## 7. METHODOLOGICAL GUIDELINES FOR STUDENTS

The following documents should be made available to the trainee before the start of the course:

- training and methodological documentation;
- local normative acts regulating the main issues of the organisation and implementation of educational activities, including those regulating the procedure for current monitoring and interim assessment of students;
- the schedule of consultations of the teaching staff.

The level and depth of mastering the discipline is determined by the active and systematic work of students in lectures, seminars, independent work, including in terms of identifying the most significant and relevant problems for further study. A special condition for qualitative mastering of the discipline is an effective organisation of work, which allows distributing the academic workload evenly in accordance with the schedule of the educational process.

When preparing for classes, students have the opportunity to attend consultations with the staff of UNECON according to the timetable set out in the schedule of consultations.

The students' in- and out-of-classroom work should aim to form:

- the fundamentals of the learner's world view and scientific understanding;
- basic knowledge relevant to the training area and the declared professional field, forming the target and professional basis for training;
- professional competences oriented towards the needs of the labour market;
- an individual trajectory by mastering a unique set of professional competences that complement the learner's competence model, through a focus on specific professional specialised areas of knowledge defined by labour market representatives;
- meta-skills for learners, such as teamwork and leadership, data analysis, digital skills, project design and implementation, intercultural interaction.

## 8. SPECIFICATIONS FOR TEACHING DISABLED PERSONS

Students with disabilities, if necessary, are taught on the basis of an adapted work programme using special teaching methods and didactic materials that take

into account the particularities of their psychophysical development, individual capacities and health status.

In order for disabled persons and persons with disabilities to master the curriculum, the University shall ensure that:

- for the visually impaired and visually impaired: availability of information on the timetable in accessible places and adapted forms for learners who are blind or visually impaired; presence of an assistant to assist the learner as needed; production of alternative formats of teaching materials (large print or audio files);
- for the hearing-impaired and hearing-impaired: adequate sound reproduction of information;
- for persons with disabilities and persons with mobility impairments: the possibility of unimpeded access for students to classrooms, restrooms and other areas of the department, as well as their stay in these areas.

Learners with disabilities and persons with disabilities are provided with printed and/or electronic educational resources in forms adapted to their disabilities. The education of students with disabilities may be organised with other students or in separate groups or organisations.



## ASSESSMENT RESOURCES

### 1.1 Control tasks and assignments for interim attestation

Is not provided by the work programme of the discipline.

### 1.2 Topics for written task

Is not provided by the work programme of the discipline.

### 1.3 Interim checkpoints

Number	Type	Method of conduct	Topic number
1	Problem solving	in writing	1-3
2	Analytical work	in writing	4-6
3	Monitoring	with the help of technical means and information systems	1-7

### 1.4 Other assessment objects

Is not provided by the work programme of the discipline.

### 1.5 Self-study

Name of self-study	Topic number
Doing homework	2-6
Preparation for lectures and practical classes	2-7
Performance of calculation, analytical, settlement-graphic and other tasks	4-6
Exam preparation	1-7
Working with analytical databases, regulatory documents, reference literature	4-7

### 1.6 Grading scale

Scales of assessment and procedures for assessing learning outcomes of the discipline are regulated by the Regulations on the current control of progress and interim attestation of students in higher education programmes and the Regulations on the scoring and rating system.

**A grading and rating system** is used to assess the learning outcomes of the discipline:

The final control of the discipline is an examination (or a differentiated test), the final grade being formed in accordance with the scale given in the table below:

Points	Grade
<55	Not passed
>=55	Passed

## Grading scale

2 (points to 54)	Demonstrates a lack of understanding of the problem. Many of the requirements of the assignment are not met. An initial perception of the material is demonstrated. The work is incomplete and/or plagiarised.
3 (points 55-69)	Demonstrates a partial understanding of the problem. Most of the requirements of the task have been met. Mastery of the elements of the assigned material. The material is mostly clear and coherent.
4 (points 70-84)	Demonstrates considerable understanding of the issue by the discipline. All requirements of the assignment are fulfilled. The content of the completed tasks is disclosed and examined from different perspectives.
5 (points 85-100)	Demonstrates full understanding of the problem. All requirements of the assignment are fulfilled. Demonstrates proficiency in the discipline. The completed assignments are holistic, complete, structured, present different points of view and demonstrate creativity.