

Ministry of Education and Science of Ukraine
National Aerospace University
"Kharkiv Aviation Institute"

Department of Economics and Public Administration (No. 601)

APPROVE

Guarantor of the educational program



A. DORONIN

" 29 " August 2025

COMPULSORY COURSE SYLLABUS

Statistics

(name of academic discipline)

Fields of knowledge: 07 Management and administration

Specialty: 073 Management

Educational program: Management

Level of higher education: first (bachelor's degree)

The syllabus is effective from 01.09.2025

Kharkiv – 2025

Developer: Professor of Department 601,

Doctor of Public Administration, Full Professor

(position, academic degree and title, first and last name)



(signature)

Victoriaia SHVEDUN

The syllabus of the academic discipline was considered at the meeting of the Department of Economics and Public Administration (No. 601)

Protocol No. 1 dated "29" August 2025.

Head of the Department

Dr. of Public Administration, Prof.

(academic degree and academic title)



(signature)

Veronika KOVALCHUK

(first name and SURNAME)

Agreed with the representative of education seekers:

(signature) (initials and surname)

1. General information about the teacher



Shvedun Viktoriia, Doctor of Science in Public Administration, Full Professor. Teaches the following disciplines at the university:

- Public administration in the sphere of economic;
- European integration policy;
- International market of goods and services;
- International economic relations;
- Innovation and digital transformation;
- International investment activity.

2. Description of the academic discipline

Form of education	<i>Full-time, part-time</i>
Semester	3
Language of instruction	Ukrainian
Type of discipline	<i>Required</i>
Course volume: ECTS credits/number of hours	<i>full-time</i> : 3 ECTS credits / 90 hours (56 classroom hours, of which: lectures – 32, practical – 24; SRH – 34) <i>part-time</i> : 3 ECTS credits / 90 hours (6 classroom hours, of which: lectures – 2, practical – 4; SRH – 84)
Types of educational activities	Lectures, practical classes, passing modular tests, independent work
Types of control	Current control, module control, semester control – credit
Prerequisites	Mathematics for economists (higher mathematics, probability theory and mathematical statistics)
Co-requisites	Enterprise economics, Finance, Management
Post-requisites	Data analytics in economics. Applied econometrics and modeling.

3. Purpose and objectives of the academic discipline

The purpose is: to develop knowledge about methods of collecting, processing and analyzing information on socio-economic phenomena and processes.

Tasks: to study the principles of organizing statistical observations, in particular sample observations, systematization and generalization of statistical data; logical justification and algorithm for calculating various statistical indicators, composite indices and rating estimates; study methods for analyzing distribution patterns; mastering methods for analyzing relationships and assessing the effects of factors on the variation and dynamics of the phenomena under study; acquiring skills to apply graphic and visual methods of generalization and data analysis.

After mastering the discipline, the applicant will acquire the following **competencies:**

Competencies acquired:

Integral competence:

The ability to solve complex specialized tasks and practical problems in the economic sphere, which are characterized by complexity and uncertainty of conditions, which involves the application of theories and methods of economic science.

General Competencies (GC)

After completing this program, the student will be able to:

– The ability to preserve and multiply moral, cultural, scientific values and multiply the achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technology, to use various types and forms of physical activity for active recreation and leading a healthy lifestyle.

- The ability to abstract thinking, analysis, synthesis;
- The ability to apply knowledge in practical situations;
- The ability to make decisions and act, adhering to the principle of inadmissibility of corruption and any other manifestations of dishonesty.

Professional competencies

After completing this program, the student will be able to:

- The ability to analyze and structure the problems of the organization, to form well-founded decisions;
- The ability to organizational and simulation modeling of economic processes based on a systemic approach using specialized information technologies;
- Ability to ensure timely and effective implementation of production organization tasks, including at aerospace enterprises in Ukraine;
- Ability to manage the work of industrial enterprises, to take responsibility for their decisions within the framework of professional competence.

Program learning outcomes:

- The ability to analyze and structure the problems of the organization, to form well-founded decisions;
- The ability to organizational and simulation modeling of economic processes based on a systemic approach using specialized information technologies;

- Ability to ensure timely and effective implementation of production organization tasks, including at aerospace enterprises in Ukraine;
- Ability to manage the work of industrial enterprises, to take responsibility for their decisions within the framework of professional competence.

Program learning outcomes:

- Preserve moral, cultural, scientific values and increase the achievements of society, use various types and forms of physical activity to lead a healthy lifestyle.
- Demonstrate knowledge of theories, methods and functions of management, modern concepts of leadership.
- Demonstrate skills in identifying problems and substantiating management decisions.
- Demonstrate knowledge of the specifics of management in the aerospace industry
- Effectively use the tools and technologies of modern administrative management in managing operational processes in the divisions of an industrial enterprise, form and improve the enterprise management system
- Develop, plan and form energy saving measures in order to save energy and increase the energy efficiency of an industrial enterprise

4. Content of the academic discipline

MODULE 1.

Content module 1. "Statistical observation, compilation and grouping of statistical data"

Topic 1. Methodological principles of statistics.

Abstract:

Establishment of statistics as a science. Subject of statistics. Basic concepts and categories of statistics. Statistical population. Unit of population and its characteristics. Statistical method and statistical methodology. Generalizing statistical characteristics. Branches of statistical science. Tasks of statistics in modern conditions and its organization in Ukraine. Rights and obligations of state statistical bodies. Procedure and conditions of access to statistical information. International statistical organizations. The role of applied economic and mathematical research. The law of large numbers and statistical regularities. The tasks of statistics in modern conditions and its organization in Ukraine.

Topic of the practical lesson: Methodological principles of statistics. International statistical organizations.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 2. Statistical observation.

Abstract:

The essence, sources and organizational forms of statistical observation. Types of statistical observation in relation to the time of registration of facts and the completeness of coverage of population units. Methods of obtaining statistical data. Statistical observation plan. Observation program. Primary accounting and reporting. Types of reporting. State statistical bodies. Preparatory work. Means of ensuring the accuracy of observation. Statistical forms and principles of their development. Organizational issues of the statistical observation plan. State statistical bodies. Preparatory work. Means of ensuring the accuracy of observation. Observation errors. Control of observation data.

Topic of the practical lesson: Special statistical observations.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 3. Summary and grouping of statistical data.

Abstract:

The essence and tasks of statistical summarization. Tasks of grouping and their significance in statistical research. Grouping features and their choice. Typological, structural, analytical groupings. Simple and combinational groupings. Functions of groupings. Determination of the number of groups and the size of grouping intervals. Classification of grouping features and intervals. Secondary grouping method. The most important groupings and classifications used in statistics.

Topic of the practical lesson: Main classifiers of Ukraine. Classifier of Types of Economic Activity (KVED), Commodity Nomenclature of Foreign Economic Activity (UKT FEA), Classifier of Forms of Ownership (KFV), Classifier of Fixed Assets (KOF), Unified State Register of Enterprises and Organizations of Ukraine (EDRPOU) and others.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 4. Presentation of statistical data: tables, graphs, maps

Abstract:

Means of graphical representation of statistical information. The concept of a statistical graph and its elements. Classification of statistical graphs. Statistical tables, their types.

Topic of the practical lesson: Summary and grouping of statistical data. Rules for constructing and analyzing tables. Development of table layouts. Rules for constructing graphs. Cartograms.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 5. General statistical indicators.

Abstract:

The essence, types and principles of constructing generalizing statistical indicators. Qualitative and quantitative content of a statistical indicator. Classification of types of statistical indicators. Absolute statistical quantities and their units of measurement. Relative quantities, their essence, forms of expression and types according to the analytical function. Basic and chain relative quantities. The relationship between individual types of relative quantities.

Topic of the practical lesson: The essence and conditions for the application of average quantities. Properties of average quantities. Types, forms of average quantities. The choice of the form and type of average quantities depending on the nature of the source data. Mode and median in statistics. Calculation of the mode and median in an interval distribution series.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 6. Analysis of distribution series.

Abstract:

The concept of a distribution series and its elements. Types and forms of distribution series. The main characteristics of a distribution series: mean, mode, median, quartiles, deciles. The essence of variation, the basics of its measurement and comparison. Absolute and relative characteristics of variation. Characteristics of the distribution form. Types and interrelation of dispersions (total, group, average of group, intergroup dispersion). The rule of variation decomposition.

Topic of the practical lesson: Population homogeneity. Asymmetry and kurtosis. Variance of an alternative trait. Use of variation characteristics in socio-economic research.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Modular control 1

Content module 2. Analysis of statistical information.

Topic 7. Analysis of the intensity of dynamics.

Abstract: Dynamic series as a basis for analysis and forecasting socio-economic development. Types of dynamic series. Statistical characteristics of dynamic series and their relationship. Methods for calculating the average level in dynamic series. Economic essence and technique for calculating the average values of the main characteristics of dynamic series. Geometric average and chronological average, calculation technique and application cases. Absolute and relative speed of dynamics.

Topic of the practical lesson: Construction of dynamics series. Interrelation of chain and basic characteristics of dynamics. Assessment of acceleration (deceleration) of development. Lead coefficient. Comparative analysis of dynamics series.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 8. Analysis of development trends and fluctuations.

Abstract: Methods of processing dynamic series in order to identify the main development trend. Trend equations. Characteristics of the main development trend. Forecasting based on dynamic series. Extrapolation and interpolation of the trend. Measurement of seasonal fluctuations. Seasonality index. Amplitude of fluctuations.

Topic of the practical lesson: Enlarging intervals, moving average method, bringing dynamic series to one base, closing series. Comparison of the intensity of seasonal fluctuations.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 9. Index method.

Abstract: Statistical indices, their essence and forms of expression. Types of indices. Methodological principles of constructing aggregate indices. Indexed quantity. Coefficients. Laspeyres (base-weighted) and Paasche (current-weighted) index systems. Aggregate indices and their relationship. Weighted average indices, their reduction to aggregate form. Indices of average values, their relationship and use. Territorial indices.

Topic of the practical lesson: Building individual indexes. Building general indexes in different systems.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 10. Analysis of concentration, differentiation and similarity of distributions

Abstract: Estimation of the concentration of feature values. Coefficients of localization and concentration. Calculation of differentiation indicators. Lorenz curve. Coefficient of similarity (similarity) of structures. Gini coefficient. Estimation of structural shifts.

Topic of the practical lesson: Coefficients of localization and concentration. Calculation of differentiation indicators.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 11. Statistical methods for measuring relationships.

Abstract: Types of relationships of social phenomena by nature of action; by direction; by analytical expression; by the number of features-factors. Application of the method of analytical groupings in the study of relationships of social phenomena. Effects of influence. Analysis of variance. Correlation ratio. Elasticity coefficient. Correlation-regression methods. Determination of the density of the relationship between indicators. Linear correlation coefficient. Coefficient of determination, correlation index. Mutual conjugacy tables. Pearson, Chuprov and Cramer conjugacy coefficients. Contingency (association) coefficient. Odds ratio. Identifying and measuring relationships between qualitative alternative features. Multiple and partial correlations, criteria for the significance of the relationship between factors.

Topic of the practical lesson: Nonparametric methods for identifying and measuring relationships. Rank correlation coefficient. Identifying and measuring relationships between attribute features.

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Topic 12. Selective method.

Abstract: The essence and advantages of sample observation. General population. Sample population. Representativeness errors: biased and random. Sample estimates of the mean and proportion. Confidence limits. Standard sampling error. Marginal sampling error. Relative error. Probability distribution quantile. Methods of selecting population elements for the survey: simple random, mechanical, stratified (districted), serial. Types of samples. Determining the required sample size.

Topic of the practical lesson: Methods of extending the results of a sample observation to the general population. Statistical hypothesis: null, alternative. Statistical criterion. Improbability limit. Range of permissible values. Critical region. Level of significance

Independent work of the student: Studying lecture material. Formulating questions for the teacher. Preparing materials for practical work.

Modular control 2

5. Individual tasks

The curriculum does not provide for the completion of individual tasks.

6. Teaching methods

Verbal, visual, practical; explanatory and illustrative, reproductive, partially search; testing and evaluation of knowledge, skills and abilities, oral presentation of knowledge, consolidation of educational material, independent work on understanding and mastering new material.

7. Control methods

Current control (theoretical survey and solving practical problems), written module control (testing by course sections), final control (test).

8. Evaluation criteria and distribution of points received by applicants

Table 8.1 – Distribution of points received by education seekers

Components of educational work	Points for one lesson (task)	Number of lessons (tasks)	Total points
<i>Content module 1</i>			
Work in practical classes	0...5	6	0...30
Modular control	0...20	1	0...20
<i>Content module 2</i>			
Work in practical classes	0...5	6	0...30
Modular control	0...20	1	0...20
<i>Per semester</i>			0...100

The credit is issued at the end of the semester if the applicant has scored 60 or more points during the semester. The applicant has the opportunity to receive a maximum of 100 points.

Table 8.2 – Rating scales: point and traditional

Total points	Traditional scale rating	
	Exam, differential credit	Test
90 – 100	Perfectly	Enrolled
75 – 89	Good	
60 – 74	Satisfactorily	
0 – 59	Unsatisfactorily	Not included

Criteria for evaluating the student's work during the semester:

Satisfactory (60-74) – have a minimum of knowledge and skills. Complete and defend all practical work and homework. Be able to independently characterize the company's capital, labor resources, expenses, and profitability.

Good (75-89) – have a solid minimum of knowledge, complete all tasks. Show the ability to perform and defend all laboratory work within the time specified by the teacher with justification for the decisions and measures proposed in the work.

Excellent (90-100) – pass all control points with a grade of “excellent”. Thorough knowledge of all topics and ability to apply them.

9. Course Policy

Attendance at classes. Missed classes are made up according to the consultation schedule, with prior agreement with the instructor. Issues related to academic integrity are considered by the instructor, or the procedure specified in the Academic Integrity Policy is used.

Compliance with academic integrity requirements. When studying an academic discipline, students must adhere to generally accepted moral and ethical norms and rules of conduct, the requirements of academic integrity stipulated in the Regulations on Academic Integrity of the National Aerospace University "Kharkiv Aviation Institute" (<https://khai.edu/assets/files/polozhennya/polozhennya-pro-akademichnu-dobrochesnist.pdf>). It is expected that the works of students will be their original research or reasoning. The absence of references to the sources used, fabrication of sources, plagiarism, interference in the work of other students are, but are not limited to, examples of possible academic dishonesty. Identification of signs of academic dishonesty in the written work of a student is grounds for its non-registration by the teacher, regardless of the extent of plagiarism or deception.

Conflict resolution. The order and procedures for resolving conflicts related to corrupt actions, conflicts of interest, various forms of discrimination, sexual harassment, interpersonal relationships and other situations that may arise during training, as well as the rules of ethical behavior are regulated by the Code of Ethical Behavior at the National Aerospace University "Kharkiv Aviation Institute" (<https://khai.edu/ua/university/normativna-baza/ustanovchi-dokumenti/kodeks-etichnoi-povedinki/>).

10. Methodological support

1. Petryk, V.L. Statistics: a textbook [Text] / V.L. Petryk. – Kh. : National Aerospace University "Khaylovarts'ka", 2009. – 100p.
2. Petryk V.L. Statistics [Electronic resource]: a textbook / V. L. Petryk, M. A. Holovanova. – Kharkiv: National Aerospace University "Kharkiv. Aviation Institute" named after M. Ye. Zhukovsky "Kharkiv. Aviation Institute", 2023. – 137 p. – Resource access mode: https://library.khai.edu/library/fulltexts/metod/Petryk_V.L._Holovanova_M.A._Prakt_ykum_Po_Statystytsi.pdf

The discipline page is located at the link:

<https://mentor.khai.edu/user/index.php?id=10116>

11. Recommended reading

Basic

1. Begun S. I. Statistics: a textbook / S. I. Begun. – Lutsk: 2022. – 230 p.
https://vstup.htek.com.ua/wp-content/uploads/2024/10/9.2-Begun_ZTS_2022.pdf
2. Gorodyanska L. V., Sizov A. I. Statistics for economists: a textbook./ Gorodyanska L. V., Sizov A. I.; Kyiv. National University named after T. Shevchenko, Military Institute, Department of Military Financial Support. – K.: [Kyiv. National University named after T. Shevchenko], 2019. – 350 p.
3. Dorohan-Pisarenko L. O., Yegorova O. V., Rudych A. I. Statistics: a textbook. Poltava: RVV PDAU. 2021. 300 p.
<https://dspace.pdau.edu.ua/server/api/core/bitstreams/93ab3912-7596-495a-8c4f-ca6930c4c0d6/content>
4. Statistics: textbook / S. I. PyrozHKov, V. V. Ryazantseva, R. M. Motoryn and others. – Kyiv: Kyiv. National Trade and Economics University, 2020. – 328 p.
5. Petryk V.L. (2023) Statistical analysis of the aviation industry of Ukraine in conditions of unstable demand for air transportation. Journal of economic reforms. – 2021. – No. 4(44). – P. 40–45.
<https://dspace.library.khai.edu/xmlui/handle/123456789/5820?show=full>

Auxiliary

1. Petryk V.L. (2025) Current trends and forecast scenarios for the development of the world service market in conditions of global instability. BUSINESSINFORM No. 5: 126-134. <https://doi.org/10.32983/2222-4459-2025-5-126-134>
2. Economic statistics: a textbook / V. M. Sobolev, T. G. Chala, O. S. Korepanov and others; ed. V. M. Sobolev. – Kh.: KhNU named after V. N. Karazin, 2017. – 388 p.
3. Enterprise statistics: a textbook / Ed. S. O. Matkovsky. – 3rd ed., stereotyped – K., Alerta, 2017. – 560 p.

12. Information resources

1. Official website of the State Statistics Committee of Ukraine [Electronic resource]. – Access mode: <http://www.ukrstat.gov.ua>
2. National Library named after V. I. Vernadsky. – Access mode: <http://www.nbuv.gov.ua/>
3. National Bank of Ukraine: official website. – Access mode: <http://www.bank.gov.ua>.
4. Scientific and Technical Library of the National Aerospace University “Kharkiv Aviation Institute”. – Access mode: <https://library.khai.edu/catalog>.
5. Ministry of Economy of Ukraine: official website. – Access mode: <https://www.me.gov.ua/?lang=uk-UA>.
6. Ministry of Finance of Ukraine: official website. – Access mode: <https://www.mof.gov.ua/uk>.