МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ ІМЕНІ СЕМЕНА КУЗНЕЦЯ

ЗАТВЕРДЖЕНО
на засіданні кафедри інформатики та комп'ютерної техніки
Протокол № 21 від 29.08.2025 р.

ПОГОДЖЕНО
Проректор з навчально-методичної роботи
_____ Каріна ПЕМАШКАЛО

ОБРОБКА ТА АНАЛІЗ ТАБЛИЧНИХ ДАНИХ

робоча програма навчальної дисципліни (РПНД)

Галузь знань	**всі**
Спеціальність	**всі**
Освітній рівень	**перший (бакалаврський)**
Освітня програма	**всі**
Статус дисципліни	**вибіркова**
Мова викладання, навчання та оцінювання	**англійська**

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Завідувач кафедри інформатики та комп'ютерної техніки Сергій УДОВЕНКО

Харків
2025

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

APPROVED
at the meeting of
Informatics and Computer
Engineering Department
Protocol № 21 of 29.08.2025

AGREED
Vice-rector for educational and
methodical work

_____ Karina NEMASHKALO

TABLE DATA PROCESSING AND ANALYSIS

program of the course

Field of knowledge	**All**
Specialty	**All**
Study cycle	**first (bachelor)**
Study programme	**All**
Course status	**elective**
Language	**English**

Developers:
PhD ,Associate Professor — Oleksii GOROKHOVATSKYI

PhD, Associate Professor — Olena PEREDRII

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Kharkiv

2025

INTRODUCTION

On the modern stage of development of the information environment, it can be considered that a person is no longer able to effectively process information in manual mode. Significant amounts of data that exist in information systems and are used in software products to solve actual problems of professional activity require the use of technical tools for processing and analyzing data. A table (tabular) form of storage and collection of data is sufficiently widespread, for the processing of which spreadsheet processors are used. Accordingly, the presence of competencies in the processing and analysis of tabular data and knowledge of the appropriate tools for modern specialists is a professional necessity.

The course "Table data processing and analysis" is an elective course offered to second- and third-year students of all specialties.

The goal of the course is to develop a system of competencies for future specialists to solve professional tasks that require automatic and semi-automatic processing of tabular data, their structuring, monitoring, and analysis.

The tasks of the course include:

– mastering of the basic methods and means of tabular data processing;

– acquisition of tabular data analysis skills.

The object of the course is the tabular data processing and analyzing. The subject of the academic discipline is table data.

The course introduces the basic principles of using a spreadsheet processor for data processing and analysis to applicants. Attention is paid to the use of the most popular functions and tools of a table (spreadsheet) processor. Examples of solving practical problems of data processing and analysis are considered. Tasks are proposed using the basic elements of the interface of spreadsheet editors, the basic principles of addressing when processing large tables, filtering, sorting, and grouping data, data analysis methods, methods for programming their own methods and functions. Attention is also paid to the differences in functions and functionality when performing tasks using different spreadsheet processors. The features of using cloud technologies and teamwork on a single document are considered.

The curriculum of the course provides learning in the form of lectures, laboratory sessions, and independent work. For practical assimilation of the basic topics of the course, laboratory sessions, individual work, and consultations are conducted using personal computers, local networks, and the Internet in computer classrooms of the S. Kuznets Kharkiv National University of Economics or in the format of distance online learning (if necessary). All types of classes are provided with the necessary electronic materials.

Applicants can use PNS e-learning system provided by S. Kuznets HNEU to organize learning and get access to all materials of the course.

The learning outcomes and competencies formed by the course are defined in table 1.

Table 1

Learning outcomes and competencies formed by the course

Learning outcomes	Competencies
Understand the basic functionality of table (tabular) processors, and use it to process table data	The ability to create tables with automatic calculations
	The ability to visualize anomalies (outliers) in the tables with data
	The ability to create table data with the effective gathering of corresponding data from other sources (tables)
	The ability to perform remote data processing using cloud technologies
Use table processors to process data and perform data analysis in automatic and effective way	The ability to perform one-level and multilevel sorting of the data and analyze its results
	The ability to filter data using one or multiple criteria of different types
	The ability to perform data grouping from different sources, making subtotals by grouped data
	The ability to use pivot tables and charts to process, group, and analyze of data
	The ability to use correlation data analysis
	The ability to use regression analysis to make predictions

COURSE CONTENT

Content module 1. Using table processor for calculations

Topic 1. Basics of data processing in table processor.

1.1. Principles of using table processors.

Fields of application of table processors. The most popular spreadsheet software. MS Excel versions and main differences. MS Excel interface. Basic rules of work. CSV data storage format.

1.2. Data addressing and formatting.

Data types. Formatting data in cells. Automatic filling of cells with data. Cell address. Absolute, relative and mixed addresses. Features and areas of application of addresses of different types.

1.3. Conditional formatting.

Conditional data formatting. Histograms, color scales and icon sets. Conditional formatting by formulas. Creating rules.

Topic 2. Multitable data processing.

2.1. Formation of tables using data from other tables.

Data search functions - VLOOKUP, HLOOKUP, OFFSET, INDEX, MATCH. Areas of application of search functions. Interval search. Creation of dynamic formulas. Array functions. SUMPRODUCT function.

Topic 3. Cloud table data processing.

3.1. Definition of "cloud" technologies.

"Cloud" technologies. Principles of work in the "clouds". Existing "cloud" services. Disadvantages and advantages of "cloud" computing. Different types of "cloud" technologies. Organization of joint work online.

3.2. Cloud services to process tabular data.

Content module 2. Table data filtration and analysis

Topic 4. Data sorting and filtering.

4.1. Sorting.

Data sorting. Sorting data in one column and in several. Multilevel sorting. Sorting textual and numerical data. Smart tables and the SUBTOTAL function.

4.2. Filter.

Principles of using an automatic filter. Fields of application of the filter. Disadvantages and advantages of the automatic filter. Data filtering of various types. Limitation of automatic filtering. Application of AND and OR conditions.

4.3. Advanced filter.

Advanced filter. Features of performing advanced filtering. Areas of use. Application of AND and OR conditions. Advanced filter limitations. Applying a filter to different types of data. Functions DMIN, DMAX.

Topic 5. Data grouping.

5.1. Subtotals.

Subtotals and areas of use. Subtotals within subtotals. Deleting subtotals.

5.2. Data consolidation.

Data grouping. Data consolidation. Calculation of aggregate values in data from various tables.

5.3. Pivot tables.

Definition of pivot tables. Construction of pivot tables. Calculating values inside pivot tables. Data filtering in tables. Data slices. Pivot charts.

Topic 6. Data analysis.

6.1. Correlation coefficient.

Correlation and covariance. Correlation coefficient. Random correlation. COVARIANCE and CORREL functions.

6.2. Regression.

Regression analysis. Prognostication. Trend lines. Functions FORECAST, TREND, LINEST.

6.3. Data analysis add-on.

Histograms. Random number generation. Rank and percentile.

6.4. Solver.

Topic 7. Controls, functions, procedures.

7.1. Form controls. Macros and their use.

7.2. Programming in a table processor. User functions. Restrictions when creating user functions. Volatile functions.

7.3. Procedures. Working with sheets and values in a table.

The list of practical (seminar) / laboratory studies in the course is given in table 2.

Table 2

The list of practical (seminar) / laboratory studies

Name of the topic and/or task	Content
Topic 1. Assignment 1	Studying the main elements of formatting, creating and storing data in tabular format. Application of conditional data formatting
Topic 2. Assignment 2	Using search functions to find data in other tables
Topic 3. Assignment 3	Data filtering and searching while working on a shared document in the "cloud" service
Topic 4-5. Assignment 4	Filtering large tables, sorting and grouping data (subtotals, pivot tables)
Topic 6-7. Assignment 5	Application of various data analysis tools, research of correlation and regression
Topic 6-7. Assignment 6	Solving optimization problems in ration formulation using solution search

The list of self-studies in the course is given in table 3.

Table 3

List of self-studies

Name of the topic and/or task	Content
Topic 1. Assignment 1	Practicing the use of different types of addressing and formatting. Training in the application of conditional data formatting. Learning the main aggregate functions (SUM, AVERAGE, MIN, MAX, COUNT. IF, COUNTIF, COUNTIFS)
Topic 2. Assignment 2	Researching ways to use VLOOKUP functions and INDEX + MATCH, OFFSET + MATCH combinations instead
Topic 3. Assignment 3	Research of filtering methods and search functions in "cloud" services
Topic 4-5. Assignment 4	Researching ways to filter data, sort by level, ways to group data, and pivot tables as a data analysis tool
Topic 6-7. Assignment 5	The research of correlation and regression and functions to solve the problem of forecasting
Topic 6-7. Assignment 6	Practicing the application of the search for solutions to solve the problem of optimizing the ration with different conditions

The number of hours of lectures, practical (seminar) studies and hours of self-study is given in the technological card of the course.

TEACHING METHODS

In the process of teaching the course, in order to acquire certain learning outcomes, to activate the educational process, it is envisaged to use such learning methods as:

- verbal (lectures on all topics), elements of problematic lectures (on all topics of the academic discipline);
- visual (demonstrations are included in all lecture and practical materials);
- practical (laboratory classes on all topics of the academic discipline).

In the conditions of the mixed form of education, the presentation of lecture material and/or the conduct of laboratory classes and group and individual consultations takes place using the Zoom platform, in the conditions of the usual classroom form, the classes are held face-to-face, in classrooms and computer rooms.

FORMS AND METHODS OF ASSESSMENT

The University uses a 100-point cumulative system for assessing the learning outcomes of students.

Current control is carried out during lectures, practical, laboratory and seminar classes and is aimed at checking the level of readiness of the student to perform a specific job and is evaluated by the amount of points scored:

– for courses with a form of semester control as grading: maximum amount is 100 points; minimum amount required is 60 points.

The final control includes current control and assessment of the student.

Semester control is carried out in the form of a semester exam or grading.

The final grade in the course is determined:

– for disciplines with a form of grading, the final grade is the amount of all points received during the current control.

During the teaching of the course, the following control measures are used:

Current control: performance of laboratory works and their defense (60 points), written control works (20 points), performance of test tasks (20 points).

Semester control: Grading.

More detailed information on the assessment system is provided in technological card of the course.

RECOMMENDED LITERATURE

Main

1. Alexander, M. Microsoft Excel 365 Bible / M. Alexander, D. Kusleika. – John Wiley & Sons Inc., 2022. – 1074 p.

2. Табличний процесор MS EXCEL: просунутий рівень. Практикум [Електронний ресурс] / уклад. А. А. Гаврилова, Н. О. Бринза, О. Г. Король; Харківський національний економічний університет ім. С. Кузнеця. - Електрон. текстові дан. (7,92 МБ). – Харків : ХНЕУ ім. С. Кузнеця, 2021. – 242 с. – Режим доступу: http://repository.hneu.edu.ua/handle/123456789/26813

3. Excel All-in-One For Dummies / P. McFedries, G. Harvey. – John Wiley & Sons, Inc., 2022. – 763 p.

Additional

4. Marrow B. Excel 2024. A Comprehensive Guide to Learn All the Functions & Formulas with Step-by-Step Explanations, Practical Examples, plus Tips & Tricks. – 213 p.

5. Статистичні методи оцінки регіонального розвитку: методичні рекомендації до лабораторних робіт для студентів спеціальності 051 "Економіка" першого (бакалаврського) рівня [Електронний ресурс] / уклад. І. В. Аксьонова. – Харків : ХНЕУ ім. С. Кузнеця, 2022. – 77 с. – Режим доступу: http://repository.hneu.edu.ua/handle/123456789/28494

Information resources

6. Excel help and learning. – Access mode: https://support.microsoft.com/en-GB/excel.

7. Excel 2019 Data Analysis. – Access mode: https://www.tcworkshop.com /data/Downloads/TCW_Courseware/Excel/DataAnalysis.pdf