

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

**ЗАТВЕРДЖЕНО**  
на засіданні кафедри  
кібербезпеки та  
інформаційних технологій  
Протокол № 2 від 31.08.2023 р.

**ПОГОДЖЕНО**  
Проректор з навчально-методичної роботи



Карина НЕМАШКАЛО

**ТАБЛИЧНИЙ ПРОЦЕСОР MS EXCEL: ПРОСУНУТИЙ РІВЕНЬ**  
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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Харків  
2023

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

**APPROVED**  
at the session of  
the Department of Cybersecurity  
and Information Technologies  
Protocol № 2 31.08.2023.

**AGREED**  
Vice-Rector for Educational and  
Methodical Work  
Karina NEMASHKALO




**TABULAR PROCESSOR MS EXCEL: ADVANCED LEVEL**

**Syllabus of the academic disciplines (SAD)**

Branch of knowledge	<b>all</b>	
Specialty	<b>all</b>	
Educational level	<b>first (bachelor's)</b>	
Educational program	<b>all</b>	
Status disciplines		<b>selective</b>
Language teaching, teaching and assessment		<b>English</b>

Developer:  
Ph.D., Assoc. Prof.

  
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# INTRODUCTION

In the work of modern enterprises, the possibility of qualitative use of existing information and the possibility of obtaining new knowledge as a result of the transformation and visualization of so-called "raw" data are becoming more and more important. The ability of the company's employees to extract the necessary data and the ability to present them in the form of various reports is directly related to the results that can be applied by the company's management for the current analysis of activities and further decision-making regarding the improvement of its work.

Tabular processor MS Excel is powerful tool for receiving rational solutions in those cases where processing of large volumes of information is required, related to search, filtering, sorting and obtaining the final results values using various functions.

The purpose of teaching the discipline " Tabular processor MS EXCEL: advanced level " is to develop practical skills in using the software product MS Excel as a tool for creating spreadsheets, complex diagrams and forecasting functions, which will allow you to freely operate large amounts of data and reflect the dynamics of production and marketing processes.

Tasks educational disciplines is:

- assimilation basic methods of working with built-in functions, MS Excel add-ins, macros;
- acquiring skills in working with the MS Excel spreadsheet in the context of solving economic problems and visualizing results.

The object of studying the discipline is the process of transformation, processing and presentation of information in the MS Excel spreadsheet.

The subject of the educational discipline is the functions, tools, add-ins of MS Excel and the principles of their application for solving practical economic problems.

Learning outcomes and competences formed by the educational discipline defined in table 1.

Table 1

The learning outcomes and competence, which forms educational discipline

<b>Learning outcomes</b>	<b>Competencies that a higher education applicant should master</b>
Apply appropriate economic and mathematical methods and models to solve economic problems.	Ability to search, process and analyze information from various sources.
To apply acquired theoretical knowledge to solve practical tasks and meaningfully interpret the obtained results.	The ability to apply computer technologies and data processing software to solve economic problems, analyze information and prepare analytical reports.
To use information and communication technologies to solve social and economic problems, prepare and present analytical reports.	The ability to justify economic decisions based on an understanding of the regularities of economic

	systems and processes and with the use of modern methodological tools. The ability to effectively apply information technologies in business and financial management.
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## Curriculum

### Content of educational discipline

#### Module 1. Basic functions of MS Excel.

**Topic 1. General principles of working with functions of MS Excel. Financial functions as a means of monitoring and planning the company's investments.**

**1.1. Built-in functions of MS Excel and principles of their use.** Categorical division of built-in functions. Their place in making calculations according to formulas. Absolute and relative references. Rules for recording functions. Working with the Function Wizard.

##### **1.2. Financial functions of MS Excel.**

Studying the structures of the most common financial functions. Financial functions of MS Excel for calculating the dynamics of payments. Financial functions of MS Excel to calculate interest on loans/investments. MS Excel financial functions for calculating payment terms.

**1.3. Financial functions as a means of monitoring and planning the company's investments.**

Application of financial functions of MS Excel to solve problems of tracking payments. Using charts to visualize calculation results. Interpretation of the obtained calculation results.

#### **Topic 2. Complex formulas in MS Excel.**

##### **2.1. Statistical and mathematical functions. The degree of function nesting.**

Overview of statistical functions and their place in the analysis of large data sets. Application examples. Overview of mathematical functions and their place in data processing. Principles of formation of complex formulas.

##### **2.2. Date and time functions. Logical functions.**

Overview of date and time functions and operations on Date and Time data types. The place of logical functions in the organization of the computing process with condition(s). Degrees of the IF function nesting.

##### **2.3. Conditional formatting. VLOOKUP and HLOOKUP functions as a**

## **means of extracting information from the array.**

Field of application of conditional formatting. Conditional formatting settings and forms. **VLOOKUP (HLOOKUP)** functions and their application for obtaining information from data arrays. Function structure and argument requirements.

## **Topic 3. Organization of checking the correctness of the contents of cells in MS Excel, the Special Paste tool.**

### **3.1. Data validation options.**

Data validation menu. Settings. Validation condition by data type. Specifics of working with a list.

### **3.2. Organization of a prompts during entering data.**

Settings. Entering the prompt text.

### **3.3. Forming a message in case of an error during entering data.**

Error message in case of. Settings. Types of reaction to an error. Entering the text of the message.

### **3.4. Special Paste.**

Transform data using the capabilities of Special Paste. Customizing the process of inserting data from the clipboard.

## **Topic 4. Data analysis and forecasting in MS Excel.**

### **4.1. Built-in analysis and forecasting functions.**

The specifics of working with the **LINEST** function. Its capabilities. Structure of the **LINEST** function and requirements for its arguments. **TREND** function. Its capabilities and structure. Forecasting techniques without using functions.

### **4.2. The Trendline tool and its settings.**

Working with scattering charts. Possibility of approximation of statistical dependencies using a trend line. Types of dependencies in a trend line. Setting approximation parameters and visualization form..

### **4.3. MS Excel analysis package and its components .**

Parameters and field of application of the component of the Histogram analysis package. Histogram settings. Pocket borders. Regression, correlation and ANOVA. Mathematical essence. Input data and settings for these components of the MS Excel Analysis Package. Forms of output and their interpretation.

## **Topic 5. Tabular arrays and working with arrays in MS Excel.**

### **5.1. The array formulas and the specifics of obtaining information in the range.**

Rules of mathematical multiplication of matrices. Argument requirements when using array formulas. Procedure for working with array formulas.

### **5.2. Mathematical operations with arrays.**

Determination of the resulting range. Addition, subtraction and multiplication of matrices.

### **5.3. Solving linear algebra problems using operations with arrays.**

Calculation of the discriminant. Solving the system of linear equations by methods of linear algebra. Operations on matrices and vectors.

## **Module 2. Add-ons in MS Excel. Working with macros and VBA.**

### **Topic 6. Add-in MS Excel: goal-seek. Sorting, filtering and summarizing.**

#### **6.1. Setting up the MS Excel add-in: goal-seek.**

The principle of the add-in work. Types of problems that should be solved with application goal-seek. Application limitations. Adjusting the accuracy of calculations.

#### **6.2. Application of goal-seek for solving practical problems.**

Solving mathematical and economic problems using goal-seek. The specifics of data preparation to obtain a correct result.

#### **6.3. Sorting, filtering, summarizing, pivot tables.**

Sorting tools. Sorting data by several criteria at the same time. Filter settings. Autofilter. Advanced filter. Pivot tables.

### **Topic 7 . Add-in for MS Excel: Data analysis.**

#### **7.1. Regression.**

Presentation of input data. Customization of output of results. Interpretation of the obtained results. Evaluation of the significance of coefficients. Statistical indicators in the report.

#### **7.2. Descriptive statistics .**

Presentation of input data. Customization of output of results. Interpretation of the obtained results.

#### **7.3. Correlation analysis.**

Presentation of input data. Setting the parameters of the analysis and displaying the results. Interpretation of the obtained results.

#### **7.4 . Analysis of variance (ANOVA).**

Types of variance analysis. Inbox view for each of them. Setting the parameters of the analysis and displaying the results. Interpretation of the obtained results.

#### **7.5. Other tools of the Data Analysis add-on.**

Covariance. Histogram. Exponential smoothing. Moving average. Random number generator.

## **Topic 8. Add-in MS Excel Solver. Solving optimization problems.**

### **8.1. Solver setting.**

Preparation of input data. Setting the directionality of the objective function. Formation of restrictions. Selection of the optimum search method.

### **8.2. Solving the problem of optimal production planning using Solver.**

Compilation of a mathematical model on an MS Excel sheet. Organization of the calculation using Solver. Analysis and interpretation of the received decision. Sustainability report analysis.

**8.3. Solving the transport problem of optimal production planning using Solver.**

Specifics of data preparation. Compilation of a mathematical model for MS Excel sheet. Organization of the calculation using Solver. Analysis and interpretation of the received decision. Sustainability report analysis.

## **Topic 9 . The basis of working with macros.**

### **9.1. Creating and using a macro.**

The concept of macro. Recording a macro as a sequence of actions. Calling and using a macro.

### **9.2. Editing a macro.**

Opening the macro editor. Control panel. Relative and absolute references in macros.

### **9.3. Visual editor Basic for Application.**

Visual environment Basic for Application - a place to work with macros. Editing and viewing macro code in this environment. Menus and VBA Features. View commands.

## **Topic 10 . The basis of work with Visual Basic for Application.**

### **10.1. Forms and modules of the Visual editor Basic for Application.**

Creation of custom forms. Tools for working with forms. Setting the form parameters. Linking forms with modules. Writing macros that work with forms.

**10.2. Working with a linear algorithm in the Visual editor Basic for Application.**

Solving practical problems using a linear algorithm. Creating a custom form and recording a linear algorithm in the module. Organization of the computational process using the VBA language. Calling and testing the operation of the algorithm. Troubleshooting and debugging the program.

### 10.3. Working with a branched algorithm in the Visual editor Basic for Application.

Solving practical problems using a branched algorithm. Creating a custom form and recording a branched algorithm in the module. Using branching operators. Organization of the computational process using the VBA language. Calling and testing the operation of the algorithm. Troubleshooting and debugging the program.

List laboratory classes / tasks for educational given by discipline in table 2.

Table 2

#### List laboratory classes / tasks

Name topics and / or task	Content
Topic 1. Task 1.	Work with financial functions and building a data table in MS Excel
Topic 2. Task 2.	Complex formulas in MS Excel
Topic 3. Task 3.	Organization of checking the correctness of the contents of cells in Excel, using the capabilities of Special Paste
Topic 4. Task 4.	Analysis and data forecast using functions MS Excel
Topic 5. Task 5.	Tabular arrays and working with arrays in MS Excel
Topic 6. Task 6.	MS add-in Excel: goal-seek. Filtering and use of pivot tables
Topic 7. Task 7.	MS add-in Excel: Data analysis
Topic 8. Task 8.	MS add-in Excel: Solver. Solving optimization problems in MS Excel"
Topic 9 . Task 9 .	The basis of work with macros in MS Excel
Topic 10. Task 10.	The basis of VBA programming ( Visual Basic For Applications ) in MS Excel. Linear and branched algorithms

List independent work by educational discipline given in table 3.

Table 3

#### List independent work

Name topics and / or task	Content
Topic 1 - 10	Learning new material: watching video lectures and knowing the MS Excel help system
Topic 1 -10	In-depth study of the material: performance of typical tasks
Topic 1 -10	In-depth study of the material: preparation to laboratory work



Number hours lectures, and laboratory classes and hours of independent work are given in the work plan (technological map) with educational disciplines.

### **TEACHING METHODS**

During the teaching process to achieve specific learning outcomes, the activation of the educational process involves the use of various teaching methods, including:

Verbal (lecture - visualization (Topic 1, 2, 3, 4, 6, 7, 9, 10), problematic lecture (Topic 5), lecture-dialogue (Topic 8)).

Visual (demonstration (Topic 1-10)).

Practical (laboratory work (Topic 1 – 10)).

### **FORMS AND METHODS EVALUATION**

The university uses a 100-point accumulative system for evaluating the learning outcomes of students of higher education.

**Current CONTROL** is carried out during lectures and laboratory classes and aims to check the level preparedness acquirer higher education to implementation specific work and is estimated by the amount collected points, namely, for disciplines with a form of semester control credit: maximum amount – 100 points; minimal sum - 60 points.

**Semester control** is conducted in the form of a semester credit.

*Final rating by educational discipline* with form semester control test defined by: summarizing every one points received under current control.

During the teaching of the academic discipline are used following control measures (current control):

performance and defense of laboratory works (10 works per 8 points),

written tests (2 tests per 5 points, one - 10 points).

Semester control credit.

More detailed information of systems assessment given in general plan (technological map) from educational disciplines.

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