

## Work programme of the discipline:

<b>Course title</b>	<b>BUSINESS MATHEMATICS AND BUSINESS STATISTICS</b>
<b>Level of higher education (degree)</b>	FIRST(BACHELOR)
<b>Field of study</b>	07 MANAGEMENT AND ADMINISTRATION
<b>Major</b>	073 MANAGEMENT
<b>Program subject area</b>	MANAGEMENT (ENGLISH)
<b>Status of the discipline</b>	Compulsory
<b>Mode of studies</b>	FULL-TIME, PART-TIME, E-LEARNING
<b>Total number of hours/ ECTS credits</b>	150 HOURS /5 ECTS CREDITS
<b>Language of instruction</b>	ENGLISH
<b>Lecturer</b>	KRYKUN IVAN HRYHOROVYCH ASSOC. PROF., PH.D.
<b>Lecturer's profile</b>	<a href="#">Крикун Іван Григорович — Університет «КРОК»</a>
<b>Tel. number</b>	
<b>E-mail</b>	krykunih@krok.edu.ua
<b>Consultations</b>	CONSULTATIONS IN MS TEAMS: THURSDAY, 16:00 P.M.-16.30 P.M.

### 1. Brief summary of the course

The purpose of the course is to provide knowledge of mathematical calculations and statistical analysis in business that can be used in management and administration.

The course objectives are:

to develop in students an understanding of the specifics of using calculations in business problems;

to develop in students the ability to perform mathematical calculations when solving business problems;

to teach students how to perform statistical calculations in business and the elements of statistical business analysis;

to provide information about the main functions of universal computer applications for performing mathematical and statistical calculations in business.

As a result of studying the academic discipline, the student must know:

to solve which tasks in business mathematical calculations are used and special formulas are applied;

how to perform statistical data processing to solve business problems;

which software add-ons to use for effective mathematical and statistical calculations.

be able to:

use software applications for mathematical and statistical calculations in business.

## 2. Learning outcomes

### General competencies (GC)

**GC3** - Ability to abstract thinking, analysis, synthesis.

**GC10** - Ability to conduct research at the appropriate level.

### Professional competencies (PC)

**PC2** - Ability to analyze the results of the organization, to compare them with the factors of external and internal environment.

**PC3** - Ability to determine the prospects for the development of the organization.

**PC7** - Ability to choose and use modern management tools.

**PC12** - Ability to analyze and structure the problems of the organization, to form justified decisions.

### Program learning outcomes (PLO)

**PLO4** – Demonstrate skills to identify problems and justify managerial decisions.

**PLO6** – Demonstrate skills of search, collection and analysis of information, calculation of indicators to justify managerial, innovation and investment decisions.

**PLO12** – Evaluate the legal, social and economic consequences of the organization functioning, including labour relations in the organization.

**PLO16** – Demonstrate skills of independent work, flexible thinking, openness to new knowledge, be critical and self-critical.

## 3. Course scope

Type of class	Total number of hours/ ECTS credits – 150 HOURS /5 ECTS CREDITS		
	full-time	part-time	e-learning
Total number of hours / mode of studies			
lectures	28	14	14
seminars / practical	22	7	7
Individual work	100	129	129

## 4. Prerequisites

There are no prerequisites for this course.

## 5. Hardware and software

PC / laptop, Internet access, camera, microphone

**6. Course policies** – students must adhere to a code of academic integrity: <https://int.krok.edu.ua/images/download/code-of-academic-integrity-2025.pdf>

Academic integrity is the presentation of one's own work and the proper recognition of the contribution of others.

Any violation of this principle constitutes academic dishonesty and may result in poor evaluation and disciplinary action.

**Forms of academic dishonesty include:**

- Plagiarism - presenting all or part of someone else's work as one's own in an academic exercise, such as an exam, a computer program, or a written assignment.
- Fraud - Using or attempting to use unauthorized materials during an exam or assignment, such as using unauthorized texts or notes or improperly obtaining (or attempting to obtain) a copy of an examination or exam answers.
- Promoting academic dishonesty - helping others commit an act of dishonesty, such as replacing an exam or completing a task for someone else.
- Fabrication - modification or transfer, without permission, academic information, or records.

## **7. Programme of the course**

### **Module #1**

#### **Topic 1: Succeeding in Business Mathematics**

Succeeding In Business Mathematics. How Math helps business. What must know. How to use formulas for calculating results. Differences between classical Math and business Math for values and numbers. Steps and procedures required to solve business problems using Mathematics.

#### **Topic 2: Back to the Basics**

Order of Operations. Fractions, Decimals, and Rounding. Percentages. Algebraic Expressions. Linear Equations—Manipulating and Solving. Natural Logarithms.

#### **Topic 3: General business management applications. Human resources and economic applications**

Percent Change. Averages. Ratios, Proportions, and Prorating. Gross Earnings. Personal Income Tax. Indexes.

#### **Topic 4: Marketing and accounting fundamentals. Marketing applications**

Cost-Revenue-Net Income Analysis. Break-Even Analysis. Figuring Out the Cost: Discounts. Markup: Setting the Regular Price. Markdown: Setting the Sale Price. Merchandising.

#### **Topic 5: Accounting applications. Simple interest: Working with single payments and applications**

Sales Taxes. Property Taxes. Exchange Rates and Currency Exchange. Invoicing: Terms of Payment and Cash Discounts. Principal, Rate, Time. Moving Money Involving Simple Interest. Savings Accounts and Short-Term GICs. Promissory Notes. Application: Loans. Treasury Bills and Commercial Papers.

**Topic 6: Compound Interest: working with single payments. Compound Interest: applications involving single payments**

Compound Interest Fundamentals. Determining the Future Value. Determining the Present Value. Equivalent Payments. Determining the Interest Rate. Equivalent and Effective Interest Rates. Determining the Number of Compounds. Long-Term GICs. Long-Term Promissory Notes. Savings Bonds. Strip Bonds. Inflation, Purchasing Power, and Rates of Change.

**Topic 7: Compound Interest: Annuities. Compound Interest: Special applications of annuities. Understanding amortization and its applications**

Fundamentals of Annuities. Future Value of Annuities. Present Value of Annuities. Annuity Payment Amounts. Number of Annuity Payments. Annuity Interest Rates. Deferred Annuities. Constant Growth Annuities. Perpetuities. Leases. How to Purchase a Vehicle. Planning Your RRSP. Calculating Interest and Principal Components. Calculating the Final Payment. Amortization Schedules. Special Application: Mortgages.

**Module #2**

**Topic 8: Introduction and descriptive statistics**

Introduction: Defining the Role of Statistics in Business. Data Structures: Classifying the Various Types of Data Sets. Histograms: Looking at the Distribution of Data. Landmark Summaries: Interpreting Typical Values and Percentiles. Variability: Dealing with Diversity.

**Topic 9: Probability in business**

From set theory to probability. Probability: Understanding Random Situations. Random Variables: Working with Uncertain Numbers. Expected value, moments, and co-moments.

**Topic 10: Statistical inference**

Random Sampling: Planning Ahead for Data Gathering Confidence Intervals: Admitting That Estimates Are Not Exact.

**Topic 11: Distributions**

Probability distribution. Terminology. Discrete distributions. Continuous distributions. Examples for business.

**Topic 12: Regression**

Correlation and Regression: Measuring and Predicting Relationships. Multiple Regression: Predicting One Variable from Several Others.

**Topic 13: Time series**

Report Writing: Communicating the Results of a Multiple Regression. Time Series: Understanding Changes over Time.

**Topic 14: Methods and applications**

Testing for Differences among Many Samples. Nonparametrics: Testing with Ordinal Data or Nonnormal Distributions. Chi-Squared Analysis: Testing for Patterns in Qualitative Data. Quality Control: Recognizing and Managing Variation.

**8. Course scheme**

Topic	Number of hours	Control form
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	Full-time			Part-time			E-learning			
	Lectures	Seminars /practical	Individual work	Lectures	Seminars /practical	Individual work	Lectures	Seminars /practical	Individual work	
<b>Module # 1</b>										
Topic 1: Succeeding in Business Mathematics	2	1	6	2	1	8	2	1	8	S, T, CS, P
Topic 2: Back to the Basics	2	1	6	2	1	8	2	1	8	S, T, CS, P
Topic 3: General business management applications. Human resources and economic applications	2	1	6			9			9	S, T, CS, P
Topic 4: Marketing and accounting fundamentals. Marketing applications	2	1	6	2	1	8	2	1	8	S, T, CS, P
Topic 5: Accounting applications. Simple interest: Working with single payments and applications	2	1	6			8			8	S, T, CA, CS, P
Topic 6: Compound Interest: working with single payments. Compound Interest: applications involving single payments	2	1	6	2	1	8	2	1	8	S, T, CA, CS, P
Topic 7: Compound Interest: Annuities. Compound Interest: Special applications of annuities. Understanding amortization and its applications	2	2	6			9			9	IA, S, T, CA, CS, P
<b>Module #2</b>										
Topic 8: Introduction and descriptive statistics	2	2	8	2	1	8	2	1	8	S, T, CA, CS, P
Topic 9: Probability in business	2	2	8			10			10	S, T, CA, CS, P
Topic 10: Statistical inference	2	2	8	2	1	8	2	1	8	S, T, CA, CS, P
Topic 11: Distributions	2	2	8	2	1	8	2	1	8	S, T, CS
Topic 12: Regression	2	2	8			10			10	S, T, CA, CS, P
Topic 13: Time series	2	2	8			12			12	S, T, CS, P
Topic 14: Methods and applications	2	2	10			15			15	S, T, CS, P
<b>Total hours</b>	<b>28</b>	<b>22</b>	<b>100</b>	<b>14</b>	<b>7</b>	<b>129</b>	<b>14</b>	<b>7</b>	<b>129</b>	-

<b>TOTAL</b>	<b>150</b>	<b>-</b>							

**Control form**

- IA – individual assignments
- S – survey
- T – test, mid-term tests
- CA – calculation assignments
- CS – solving case-studies
- P – oral presentation

**9. Individual tasks**

Individual tasks are an integral part of the educational process, as they contribute to the development of analytical skills, creative thinking and independence of students.

**Content of an individual educational and research task (educational project)**

The individual task consists of three types of questions, task options posted on the moodle platform:

1. Open question:

- o Requires a detailed, detailed answer based on theoretical knowledge and analysis of additional information.
- o Tests your understanding of the topic, ability to formulate your own opinions and argue your position.

2. Calculation task:

- o Involves performing certain calculations using formulas or business models.
- o Tests knowledge of math methods and the ability to apply them in practice.

3. Situational task:

- o Presents a real business problem or case that needs to be analyzed and a solution proposed.
- o Tests your ability to apply theoretical knowledge to solve practical problems and make informed decisions.

Requirements for completing the task:

- Clear structure: Answers should be logically structured, contain an introduction, main body and conclusions.
- Argumentation: Each statement must be supported by arguments and references to sources.
- Accuracy of calculations: When performing calculations, it is necessary to observe accuracy and use appropriate units of measurement.
- Originality: Answers must be your own and contain no plagiarism.
- Design: The work must be designed in accordance with the requirements specified on the moodle platform.

**10. Teaching methods**

In the process of studying the discipline "Entrepreneurship and starting a company", various types of educational activities, teaching methods and technologies are used.

Types of educational activities:

1. Lectures: classes where the teacher presents theoretical and practical guidance material, analyzing the main concepts and tools of marketing.
2. Practical classes: focus on the application of Entrepreneurship tools.

Teaching methods and technologies:

1. Presentations and multimedia materials: the use of slides, videos and graphs, which facilitate the perception of information and make the educational process more visual.
2. Active learning methods: include group projects, discussions, role-playing games, and brainstorming sessions that promote active student involvement in the process.

3. Case method: analysis of real business situations, which allows students to practically apply theoretical knowledge, develop critical thinking and decision-making skills.

Use of information technologies: interactive platforms for learning

### 11. Control methods

Control measures are used to determine the success of training. Control measures include mid-term tests (2) and final control.

Mid-term tests are carried out during practical (seminar) classes and is aimed at checking the level of preparedness of the student to perform a specific task.

The final control is carried out to evaluate the learning results after the end of the study of the discipline (semester control) or modules separated according to the working curriculum.

During the study of this course, the following forms of current control are used: a mid-term tests.

When studying this course, the following form of semester control is used: credit.

### 12. Distribution of points received by students

Evaluation of student learning results is carried out according to the University scale (0-100, taking into account optional tasks - 120 points) and the national scale.

General course evaluation system: Participation in the work during the semester / exam – 70%/30%

All tasks must be written independently, plagiarism is prohibited, no references or citations are required. The quality and originality of your arguments are evaluated. The assignments should be presented in Moodle.

### 13.1. Scoring scheme for the course

Type of educational activity	Max score	Max total score
Modules #1 & #2		
Solving case-studies (3 x 5 points)	15	
Calculation assignments (4 x 2,5 points)	10	
Surveys / Test (2 x 5 points)	10	
Oral presentation (2 x 5 points)	10	
Individual work (1 x 10 points)	10	
Mid-term test (2 x 7,5 points)	15	
<b>Total for modules #1 &amp; #2</b>	<b>70</b>	
<b>Final test</b>	<b>30</b>	
<b>Total for the course</b>		<b>100</b>

The maximum score for completing an optional assignment is 20 (for example, writing a scientific article).

### 13.2. Conditions for awarding points

1. Solving case-studies (Maximum Score – 5 Points)

- Completeness of the Solution (2 Points): All stages of the problem-solving process are correctly presented, and all formulas and methods are justified.

- Accuracy of Answers (2 Points): All numerical data and calculation results must be accurate.

- Clarity of Presentation (1 Point): Logical structure of the work, clear presentation of solutions, and correct terminology.

2. Calculation assignments (Maximum Score – 2,5 Points)

- Completeness of the Solution (1 Point): All stages of the problem-solving process are correctly presented, and all formulas and methods are justified.

- Accuracy of Answers (1 Point): All numerical data and calculation results must be accurate.

- Clarity of Presentation (0,5 Point): Logical structure of the work, clear presentation of solutions, and correct terminology.
- 3. Tests (Maximum Score – 5 Points)
  - Number of Correct Answers (5 Points): Students receive 0,25 points for each correct answer (total number of tests per session is 20).
- 4. Survey (Maximum Score – 5 Points)
  - Correctness of Answers (3 Points): Answers to questions must be accurate and correct.
  - Coverage of the Topic (2 Points): Answers should demonstrate knowledge of all key aspects of the topic.
- 5. Oral presentation (Maximum Score – 5 Points)
  - Substance (2 Points): Completeness and depth of topic coverage, inclusion of relevant data and examples.
  - Visual Presentation (2 Points): Quality of slides, use of graphics, clarity, and aesthetics.
  - Communication Skills (1 Point): Ability to convey information to the audience, respond to questions, and engage listeners.
- 6. Individual Work (Maximum Score – 10 Points)
  - Depth of Research (3 Points): Quality of topic analysis, use of various sources of information and literature.
  - Structure and Formatting (2 Points): Adherence to formatting requirements, logical structure of the work, correctness of citations.
  - Originality and Creativity (2 Points): Presence of personal conclusions, recommendations, and interesting ideas.
  - Responses to Questions (3 Points): Engagement in presenting work results, participation in discussions, and feedback.
- 7. Mid-term tests (Maximum Score – 7,5 Points)
  - Number of Correct Answers (5 Points): Students receive 0,25 points for each correct answer (total number of tests per session is 30).

### 13.3. Final assessment criteria

University scale	Ukrainian Grade
90 and higher	excellent
70–89	good
50–69	satisfactory
1–49	unsatisfactory

### 14. Methodological provision

Attention students: all educational and methodological materials (lecture plans and videos, presentations/seminar assignments/case-studies, etc.) are submitted in Moodle Course: Business math and statistics: <https://dist.krok.edu.ua/my/courses.php>.

### 15. Recommended literature

#### Basic

1. Jean-Paul Olivier Business Math: A Step-By-Step Handbook 2021A version (Lyryx) URL – <https://openlibrary-repo.ecampusontario.ca/xmlui/handle/123456789/898>

2. Andrew F. Siegel Practical Business Statistics. Sixth Edition. URL – <https://www.amazon.com/Practical-Business-Statistics-Andrew-Siegel/dp/0123852080>

#### **Additional**

1. Business Mathematics Authors:Chris Kellman; Leslie Major; Don Mallory; Frank Gruen; and Amy Goldlist. URL – <https://pressbooks.bccampus.ca/businessmathematics/>

2. Lex Holmes, Barbara Illowsky, Susan Dean Introductory Business Statistics URL – <https://open.umn.edu/opentextbooks/textbooks/509>

#### **16. Additional information on the discipline (educational component)**

Certificates of completion for distance or online courses on the relevant topics may be credited provided that the requirements outlined in the corresponding regulation are met.

#### **Work programme of the discipline:**

Compiled by: KRYKUN IVAN HRYHOROVYCH.

Approved: at the meeting of the Department of International Business (Protocol No. 2 dated September 17, 2024).