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

ЗАТВЕРДЖЕНО
на засіданні кафедри
статистики і економічного прогнозування
Протокол № 2 від 2.09.2024 р.

ПОГОДЖЕНО
Проректор з навчально-методичної роботи

_____ Каріна НЕМАШКАЛО

ДАНІ ТА ПРИЙНЯТТЯ РІШЕНЬ
робоча програма навчальної дисципліни (РПНД)

Галузь знань	**12 Інформаційні технології**
Спеціальність	**122 Комп'ютерні науки**
Освітній рівень	**другий (магістерський)**
Освітня програма	**Комп'ютерні науки**

Статус дисципліни	**вибіркова**
Мова викладання, навчання та оцінювання	**англійська**

Розробники
д.е.н., професор
д.е.н., професор
к.е.н., доцент
викладач

підписано КЕП

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Сергій МІНУХІН

**Харків
2024**

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

APPROVED
at the meeting of the department
statistics and economic forecasting
Protocol № 2 of 2.09.2024.

AGREED
Vice-rector for Educational and Methodical work

Karina NEMASHKALO

DATA AND DECISION MAKING
Program of the course

Field of knowledge	**12 "Information technologies"**
Specialty	**122 Computer sciences**
Study cycle	**Second (master's)**
Study programme	**"Computer sciences"**

Course status	**Elective**
Language	**English**

Developer:

Doctor of Economics, professor	digitally signed	Olena RAYEVNYEVA
Doctor of Economics, professor		Konstantin STRYZHYCHENKO
PhD, associate professor		Olha BROVKO
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Head of Study Programme	digitally signed	Serhii MINUKHIN

Kharkiv
2024

INTRODUCTION

A large part of management is decision-making. It is inherent in almost everything that managers do. Managers obtain information through information systems, oral communication, and possibly other means. A classic list of managerial tasks includes planning, organizing, delegating or directing, coordinating or controlling, reporting, and budgeting. Some of these tasks are a direct application of decision-making, such as planning, delegating, or leading. Other tasks usually lead to solutions. So, for example, the organization of work in organizational departments and offices requires an analysis of the current work situation, and the next step may be to make a decision to change these processes. In the same way, the hiring of new employees and the assignment of employees to jobs (personnel assignments) also ends with the decision of the management. A decision is a choice. The decision maker must have two or more options available and then choose the most effective one. Thus, decision-making is one of the most important tasks of management, which uses the concepts and methods of mathematics, statistics, economics, management and psychology, and which studies the patterns of people's choice of ways to solve various types of tasks, as well as explores ways of finding the most profitable possible solutions.

The course "Data and decision-making" is a selective discipline and is studied according to the curriculum for the master's training of the "Computer Science" educational program.

The purpose of the course is to study modern methods of decision-making support, to study current problems in the field of decision-making in the activities of enterprises and organizations, to acquire the skills of applying these methods in practice for the development and justification of complex economic decisions.

The tasks of the course are:

obtaining a comprehensive understanding of the basic foundations of economics, decision-making theory and system analysis;

use of modern methods of supporting economic decision-making and develop the ability to use the presented methods;

acquiring practical skills regarding modern decision support approaches;

acquiring the skills of developing management solutions based on the justification of the process of building a solution to the problem;

acquiring the ability to make a rational choice of a method of justifying a decision for a specific task;

acquiring skills to demonstrate knowledge of data analysis and fuzzy multiple analysis.

The object of the course is data, processes and systems.

The subject of the course is theoretical and practical questions regarding the use of methods of substantiation of decisions made in various spheres of activity of the studied objects.

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
LO2. Have specialized computer science problem-solving skills necessary for conducting research and/or conducting innovative activities to develop new knowledge and procedures.	GC05. Ability to learn and master modern knowledge.
LO7. Develop and apply mathematical methods for the analysis of information models.	SC03. Ability to use mathematical methods to analyze formalized models of the subject area.
	SC06. Ability to apply existing and develop new algorithms for solving problems in the field of computer science.
LO8. Develop mathematical models and data analysis methods (including large ones)	SC04. The ability to collect and analyze data (including large data) to ensure the quality of project decision-making
LO18. Collect, formalize, systematize and analyze the needs and requirements for the information or computer system being developed, operated or supported.	SC12. Ability to develop, apply and integrate data processing and analysis technologies in high-performance systems and cloud platforms to ensure efficient use of computing resources of computer systems.
	SC05. Ability to develop, describe, analyze and optimize architectural solutions of information and computer systems for various purposes.
LO19. To analyze the current state and global trends in the development of computer sciences and information technologies.	SC05. Ability to develop, describe, analyze and optimize architectural solutions of information and computer systems for various purposes.
	SC12. Ability to develop, apply and integrate data processing and analysis technologies in high-performance systems and cloud platforms to ensure efficient use of computing resources of computer systems.

COURSE CONTENT

Content module 1. Decision-making methodology
Topic 1. The decision-making process, its principles and elements
1.1. Decision-making, the importance and significance of management decisions, the principles of decision-making. Decision-making algorithm. Rules of decision making.
1.2. The concept of the problem, its types, diagnosis, and analysis.
1.3. Types of solutions. The decision-making process. Decision theory.
Topic 2. Methods and techniques for finding effective solutions
2.1. Classification of methods and techniques for finding effective solutions.
2.2. Expert methods of decision-making. Individual and collective elections.
2.3. SWOT, PEST, ABC analysis as a basis for management decisions
Topic 3. Economic and mathematical methods of decision making
3.1. The use of Markov processes for decision making
3.2. Game theory and decision making in conditions of uncertainty
Content module 2. Practical aspects of decision-making and their informational support
Topic 4. Methods of evaluation of management decisions
4.1. Statistical theory of decision making.
4.2. Principles of evaluation of management decisions. Determining the economic efficiency of the solution.

4.3. Methods of evaluating financial decisions.
Topic 5. Business decision support systems. Data Driven Decision Making.
5.1. What is data-based decision making. The culture of using data in decision making.
5.2. Advantages of Data-Driven Company. 6 effective tips to simplify the decision-making process.
5.3. Decision support systems in business.

The list of laboratory studies in the course is given in table 2.

Table 2

The list of laboratory studies

Name of the topic and/or task	Content
Topic 1.	Laboratory work on topic 1. "Primary data analysis" Case studies on business decision-making
Topic 2.	Laboratory work on topic 2. Case studies on the use of methods and techniques in the search for effective solutions.
Topic 3.	Laboratory session on topic 3. Determination of the future state of the enterprise under conditions of high dynamism of economic processes: Markov chains and criteria of game theory.
Topic 4.	Laboratory session on topic 4. Decision tree, methods of evaluating the expediency of financial decisions as a tool for forming a rational decision
Topic 5.	Laboratory work on topic 5. Case (situational) tasks regarding the use of modern decision support systems.

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 1-5	Studying lecture material
Topic 1,2,5	Essay writing Solving a situational (case) task
Topic 3-4	Performing laboratory work

The number of hours of lecture and laboratory classes and hours of independent work is given in the work plan (technological map) for the course.

TEACHING METHODS

In the process of teaching course, in order to acquire certain learning outcomes, to activate the educational process, it is envisaged to use such teaching methods as:
group work (Topic 1-2, 5), case technologies (Topic 1-2,5), problem lectures (Topic 2), situational tasks (Topic 5), creation of situations of cognitive novelty (topics

4-5).

In person (demonstration (Topic 1-5)).

Practical (laboratory work (Topic 2-3), essay (Topic 1-2.5), case method (Topic 1-2.5), etc.).

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 and laboratory 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 course with a form of semester control examination (exam): the maximum amount is 60 points; the minimum amount that allows a student of higher education to pass an exam is 35 points

The **final control** includes current control and an exam.

Semester control is conducted in the form of a semester exam (exam). The semester exam (exam) is taken during the exam session.

The maximum number of points that a student of higher education can receive during the examination (examination) is 40 points. The minimum amount for which the exam is considered passed is 25 points.

The **final grade** in the course is determined:

− for disciplines with a form of exam, the final grade is the amount of all points received during the current control and the exam grade.

During the teaching of the academic discipline, the following control measures are used:

Current control: Laboratory work (10 points), essay in the form of a presentation (12 points), homework in the form of a case study (15 points), test control (15 points), written control works (8 points).

Semester control: **Grading including Exam** (40 points)

More detailed information about the evaluation system is provided in the work plan (technological map) for the course.

An example of an examination paper

Semyon Kuznets Kharkiv National University of Economics
Second (master's) level of higher education
Specialty 122 "Computer sciences"
Educational and professional program "Computer sciences"
Course " Data and decision making "
EXAM CARD № 1

Stereotype task (tests). (20 points)

1	Branching of decisions in the decision tree is: a) branching, which reflects the alternative, where the decision is made by the OP b) branching corresponding to an alternative where randomness chooses the outcome c) all answers are correct
2	Analysis of several alternative options for the development of the situation contributes to:

	a) making better decisions b) making more reliable decisions c) making timely decisions d) making quality decisions
3	At what stage of development of the management decision is the development of the situation predicted: a) diagnosis of the situation b) developing a forecast of the development of the situation c) analysis of the situation d) definition of goals
4	Decision making is a a) a process involving problem solving, and thus decision making is often seen as advanced problem solving b) non-probabilistic theory of decision-making, which studies the optimization of resistance to failure or unexpected opportunities in a situation of extreme uncertainty c) a theoretical framework for analyzing the combination of opinions, preferences, interests and personal well-being to achieve a group decision and/or social well-being
5	Define the axiom that states that if the winnings A and B have the same value to the decision maker, then two identical lottery tickets, differing only in that the first offers A as the prize and the second offers B as the prize, will have the same value for the person making the decision a) axiom of indifference b) independence axiom c) transitivity axiom d) axiom of rationality
6	Define the Neumann-Morgenstern axiom: "If you prefer outcome A to outcome B and outcome Y to outcome C, then you will prefer outcome A to outcome C": a) axiom of indifference b) independence axiom c) transitivity axiom
7	An extended definition of the theory of managerial decision-making: a) equates the process of making a management decision with the entire management process b) understands the process of making managerial decisions as choosing the best of many c) understands the process of making a managerial decision as the choice of an alternative to the manager d) the process of human mental activity
8	The information-disruptive theory of decision-making (IRTPR) is a) non-probabilistic decision-making theory, which studies the optimization of resistance to failure or unexpected opportunities in a situation of extreme uncertainty b) a theoretical basis for analyzing the combination of opinions, preferences, interests and personal well-being to achieve a group decision and/or social well-being c) there is no correct answer
9	Quantitative methods in situation analysis are used for: a) calculation of the efficiency of the problem being solved b) reveals changes in the development of the situation under the influence of environmental factors c) identifying the dynamics of the development of the situation under the influence d) application of a quantitative approach to the development of management decisions
10	Solutions carefully evaluated by the manager, all alternatives considered, are: a) risky decisions b) impulsive decisions c) careful decisions d) professional decision
11	The adopted management decision affects:

	a) employees of the organization b) on the organization as a whole c) on the external environment d) to the person who made this decision
12	Choice based on methods of economic analysis: a) court decision b) an intuitive decision c) a rational decision d) professional decision
13	The decision tree represents the problem of choosing a rational management solution as: a) sequence of alternatives b) connection of alternatives c) a set of alternatives
14	Decisions are made on the basis of: a) choice of alternative b) the result of choosing from several possible options c) selection of an alternative by the manager
15	The purpose of the management decision is a) the manager's decision on the performance of duties by position b) making the right management decision c) achievement of the goals set for the organization
16	The variety of decisions and the legal validity of the decision ensure: a) effectiveness of management decisions b) quality of management decision c) reliability of management decision d) optimality of management decision
17	To make a quality management decision, the decision must be described: a) only qualitative indicators b) only quantitative indicators c) both qualitative and quantitative indicators
18	To choose the optimal solution from the decision tree in the chance fork, you need to calculate: a) the probability of the result b) mathematical expectation of income c) dispersion of the result
19	What is the impact of scientific approaches and principles applied to management? a) about the effectiveness of management decisions b) on the reliability of management decisions c) on the quality of management decisions d) on the professionalism of management decisions
20	Which of the methods of forming alternative options for management decisions is based on the use of experience in solving previous similar problems: a) brainstorming method b) analog method c) a creative way

Diagnostic task 1 (calculation test). (3 points)

How can we use data and make decisions in normal economic activities?

Diagnostic task 2 (essay). (7 points)

Situational task "Sell and drive away"

In the countries of the Western world, the use of software based on the SaaS (soft as a service) model is becoming more and more popular. This model does not involve

buying a software product, but leasing it - the client pays a subscription fee and uses the program, which is stored on the developer's server. This model is very attractive, because the client does not need to spend resources on ensuring and maintaining performance, the developer is responsible for this. The client does not need to spend money and staff time on purchasing, installing, updating and maintaining server equipment and monitoring the operation of the application. However, domestic developers had to face difficulties. In particular, users in Ukraine are conservative and show significant mistrust of SaaS service providers because they fear for the preservation of confidential information.

Task.

1. How to accelerate the development of the IT products rental market in Ukraine, win the trust of medium and large businesses, develop IT solutions for business and at the same time prevent the loss of potential customers to foreign services?

2. What communication channels should manufacturers choose to promote SaaS services?

3. How to teach a client to buy a SaaS product instead of "boxed" software?

Heuristic task (calculation). (10 points)

Case "Crisis of personnel management"

Travel company "Voyage-Kyiv" LLC was founded in February 1997. The main activities of the company are: organization of foreign tourism; organization of domestic and inbound tourism; sale of tickets for regular and charter flights. Tour operator "Voyage-Kyiv" occupies a significant segment of the tourist market of Ukraine. Depending on the destination (Spain, UAE, Andorra, France, Bulgaria, Tunisia, Ukraine and others), the share of "Voyage-Kyiv" is from 20 to 60% of the market of mass tours. "Voyage-Kyiv" is a permanent participant of international tourist exhibitions and salons. More than 2,000 travel agencies from all regions of Ukraine cooperate with the company, a significant number of enterprises and commercial structures are on corporate service. A new stage of the company's development in 2003 was the project to create its own franchise network of travel agencies and transform "Voyage-Kyiv" into a closed tour operator - a tourist product manufacturer. For this purpose, the Voyage-Kyiv company purchased the well-known Ukrainian brand "Gallop across Europe", developed an advertising campaign and introduced a new technology of interaction between a tour operator - a travel agent - a tourist. On June 7, 2003, the network of travel agencies "Gallop across Europe" began its activity, which currently has 60 representative offices in 35 cities of Ukraine. Since 2004, one of the priority areas of the company's activity has been the development of domestic and inbound tourism. For this purpose, the offices of tour operators in Warsaw and Odesa are open. For the first time, tour packages with a flight from Odesa to Kharkiv were formed and offered on the market, blocks of seats for flights and hotels in Odesa were occupied, cooperation with the Polish tourism industry was established. "Voyage-Kyiv" has a reputation as a stable and successful company, a reliable business partner. Situation This company had difficulties with the implementation of its services due to the end of the holiday season (the analyzed period is late autumn), the appearance of a powerful competitor - "Around the World" LLC, which claims the same market

segment and offers consumers lower prices and is located in the immediate vicinity of the head office of Voyage-Kyiv LLC. As a result, the number of orders decreased by 25%. Because of this, the management decided to reduce the wages of employees to keep the net profit at the previous level and to reduce the prices of services to remain competitive. Such a decision caused deep indignation of employees. 5 specialists immediately left the company. Moreover, three of them held senior management positions, two were assistants and operators. Employees were immediately recruited to replace them. Three positions of middle managers are filled: a specialist with 1 year of work experience and a special education, a specialist with 5 years of work experience with a higher non-special education, and a specialist without work experience and a special education. Two other positions were taken by part-time students who resigned after 2 months. New employees were recruited in their place. At the same time, the director of the enterprise decided to retire due to old age. Since the director at the same time owned 85% of the company's shares, it was clear that he would not just vacate the chair, but also sell the shares. Therefore, the company expected not only a change of the manager, but also of the owner. He was replaced by a new manager who, possessing good human qualities, was not an expert in this matter and constantly transferred part of his responsibilities to junior employees, asked for help and various assignments. Tension and dissatisfaction with the unprofessionalism of the "newcomers" is growing among the employees. Conflicts arose between the workers and the new management. The result was a 50% decrease in profit.

Case question

1. Identify the symptoms and causes of the situation at Voyage-Kyiv LLC.

2. Analyze the market of tourist services of Ukraine and reveal the main trends of its development.

3. Develop a set of tactical and strategic measures that will help improve the company's position.

Approved at the meeting of the Department of Statistics and Economic Forecasting

protocol No. _____ dated "___" _____ 20___ year.

Examiner   Doctor of Economics, Prof. O. Rayevnyeva

Chief Department   Doctor of Economics, Prof. O. Rayevnyeva

Assessment criteria

Final scores for the exam consist of the sum of points for completing all tasks, rounded to a whole number according to the rules of mathematics.

The algorithm for solving each task includes separate stages that differ in complexity, time-consumingness, and importance for solving the task. Therefore, individual tasks and stages of their solution are evaluated separately from each other in this way:

stereotyped task in the form of closed tests – 20 tests, the maximum score per test is 1 point (the maximum number of points is 20);

diagnostic task 1 (calculation test) – maximum score 3 points:

1 point – selection of the calculation formula;

1 point – implementation of calculation actions;

1 point – formulation of the answer to the question.

diagnostic task 2 (essay)– maximum score 7 points:

1 point – understanding the essence of the task;

2 points – selection of calculation formulas or algorithm for task performance;

2 points – making a calculation or formulating an algorithm of actions to perform the task;

2 points - the presence of reasoned conclusions based on the results of analytical work;

heuristic task – maximum score 10 points:

2 points – understanding the essence of the task;

2 points – selection of the correct decision-making option that corresponds to the essence of the questions;

2 points – calculation of indicators related to the research topic;

2 points – calculation of the effectiveness of the adopted decision, disclosure of the problem and stages of its solution using methods and models;

2 points – providing reasoned conclusions based on the results of calculation work.

RECOMMENDED LITERATURE

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