

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

**ЗАТВЕРДЖЕНО**

на засіданні кафедри  
інформаційних систем  
Протокол № 1 від 27.08.2024 р.

**ПОГОДЖЕНО**

Проректор з навчально-методичної  
роботи



Каріна НЕМАШКАЛО

**СТРАТЕГІЯ ІС**

робоча програма навчальної дисципліни (РПНД)

Галузь знань	12 "Інформаційні технології"
Спеціальність	126 "Інформаційні системи та технології"
Освітній рівень	другий (магістерський)
Освітня програма	"Інформаційні системи та технології"

Статус дисципліни	обов'язкова
Мова викладання, навчання та оцінювання	англійська

Розробник:  
к.е.н., доцент

Сергій ЗНАХУР

Завідувач кафедри  
інформаційних систем

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Гарант програми

підписано КЕП

Олександр КОЛГАТІН

Харків  
2024

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

**APPROVED**

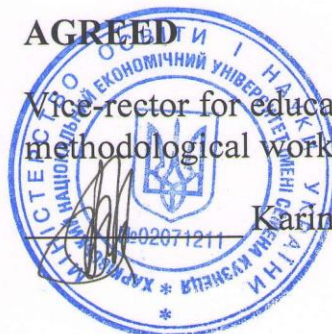
at the meeting of the informational systems  
department

Protocol № 1 of 27.08.2024

**AGREED**

Vice-rector for educational and  
methodological work

Karina NEMASHKALO



**STRATEGY OF INFORMATION SYSTEMS**

**Program of the course**

Field of knowledge	<b>12 "Information technologies"</b>
Specialty	<b>126 "Information systems and technologies"</b>
Study cycle	<b>second (master's)</b>
Study programme	<b>"Information Systems and Technologies"</b>

Course status	<b>mandatory</b>
Language	<b>english</b>

Developers:  
PhD in Economics,  
Associate Professor

Serhii ZNAKHUR

Head of the Department  
information systems

Dmytro BONDARENKO

Head of Study  
Programme

digital signature

Oleksandr KOLGATIN

**Kharkiv  
2024**

## INTRODUCTION

By now, the world practice has accumulated considerable experience in the field of building an organisation's architecture. Existing approaches and methods are largely based on the use, generalisation and integration of existing results in the field of business modeling and system analysis and design (primarily in the area of information systems design).

It should be noted that the architectural concept has led to the emergence of a fundamentally new role among the main participants in the process - the role of the architect. This role is characterised by a high status, reflecting the degree of importance of having an architecture in the organisation, the architect is usually the chief deputy CIO and is the taskmaster for both business process analysts and system analysts.

**The object of the course** is to develop students' theoretical knowledge of the basics of enterprise architecture management and information systems development, to acquire practical skills that allow modelling business processes, developing information systems architecture and optimising the structure of an enterprise.

**The objectives of the course:** to manage information systems development projects and identify, analyse, evaluate and solve emerging management problems, to develop architecture management and information systems.

**The subject of the course:** generally accepted methodologies and modern technologies of enterprise architecture management and information systems development.

**The task** of the academic course is to provide students with the knowledge and skills necessary for the development, implementation and management of information systems (IS) strategies in the context of the overall business strategy of the organization.

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

**Table 1**

**Learning outcomes and competencies formed by the course**

<b>Learning Outcomes</b>	<b>Competencies</b>
LO03	GC04, GC05, SC01, SC02, SC03, SC08
LO06	SC07
LO04	SC07
LO07	GC01, GC04, GC05, SC01, SC02, SC03
LO08	SC04, SC05
LO11	IC, GC01, GC02, SC01, SC04, SC05, SC07
LO12	IC, GC01, SC03, SC04, SC05, SC08

- LO03. Making effective decisions on the problems of information infrastructure development, creation and application of IT.
- LO04. Managing ICT development, implementation and operation processes that are complex, unpredictable and require new strategic and team approaches.
- LO06. Justifying the choice of technical and software solutions, taking into account their interaction and potential impact on solving organizational problems, organize their implementation and use.
- LO07. Making a grounded choice of project solutions and design a service-oriented information architecture of the enterprise (institution, organisation, etc.).
- LO08. Developing models of information processes and systems of various classes, to use methods of modelling, formalisation, algorithmization and implementation of models using modern computer tools.
- LO11. Solving the problems of digital transformation in new or unknown environments based on specialised conceptual knowledge, including modern scientific achievements in the field of information technology, researches and integration of knowledge from various fields.
- LO12. Improving the information system on the base of business processes analysis.

GC01. Ability to abstract thinking, analysis and synthesis.

GC02. Ability to communicate in a foreign language.

GC04. Ability to develop and manage projects.

GC05. Ability to evaluate and provide the quality of the work performed.

SC01. Ability to develop and apply IST necessary for solving strategic and current tasks.

SC02. Ability to formulate requirements for life cycle stages of service-oriented information systems.

SC03. Ability to design information systems taking into account the specifics of their purpose, incomplete/insufficient information and conflicting requirements.

SC04. The ability to develop mathematical, information and computer models of objects and informatization processes.

SC05. Ability to use modern data analysis technologies to optimize processes in information systems.

SC07. Develop and implement innovative projects in the field of ICT.

SC08. Carry out reengineering of applied information systems and business processes.

IC. The ability to solve problems of a research and innovation nature in the field of information systems and technologies.

# **COURSE CONTENT**

## **Content module 1: IS strategy fundamentals**

### **Topic 1: Introduction to the course "IS Strategy"**

Introduction to the course. The purpose and objectives of the course, its place in the educational process. Structure of the course, recommendations for its study. Organizational and methodological support of the course. Basic concepts of IS, IS strategy. History and strategic directions of IS development. Basic concepts that characterise the structure, functioning and development of the system. 9 (nine) fundamental principles of system functioning. Description of the structure of the IT strategy. The process of developing an IT strategy. The main elements and stages of IT strategy development. Problems associated with the process of developing an IT strategy.

### **Topic 2. Information system architecture. Microservices and SOA**

Modern organization (enterprise) as a business system. The concept of a business system and business processes. Process approach to managing an organization (enterprise). Business architecture and its components. The main elements of the architecture of the organisation's management system. Information system architecture. Application architecture. Technology architecture (infrastructure architecture). Platform architectures of IS. The paradigm of service-oriented systems (SOA). SOA design. Microservice architecture.

### **Topic 3. Designing information flows and data integration. Modern cloud services**

Fundamentals of IT service management within the framework of an organisation's IS strategy. Information flows. Data architecture. Types of data and means of their accumulation. Data processing centres. Other models of data storage (Databases, Data Warehouses, Data Lakes). Development of data architectures. From local to cloud data platforms. Main characteristics and components of cloud data architectures. AWS cloud services. GCP cloud services.

## **Content module 2. Building IS architectural solutions**

### **Topic 4. Building BI and Web solutions based on cloud services**

BI tools. An example of using Microsoft Power BI to visualise business data and create reports. Features of cloud computing technologies in solving problems in Microsoft Power BI. Scaling management solutions based on Microsoft Power BI. Modern Web services based on REST. REST architecture. The concept of RESTful web services. Methods of working with URIs. Flask framework. Modern cloud Web solutions based on the AWS technology stack.

## Topic 5. TOGAF

Information systems architecture frameworks. The concept of a domain. The concept of an architecture framework. Seven main parts of TOGAF that allow you to cover the entire architectural process. The enterprise continuum. Roles of the Architecture Development Method (ADM) performers. The concept of enterprise architecture according to TOGAF. Standards for describing architecture models. Zachman's scheme (ZACHMAN FRAMEWORK). TOGAF architecture framework.

## Topic 6: Estimating the cost of architectural solutions

Cloud technology platforms and services. Platform as a Service (PaaS). Application of basic architectural solutions in IS design. Criteria for choosing the architecture and infrastructure of the IS based on the assessment of the total cost of ownership. Estimating the cost of architectural solutions based on the GCP methodology. Estimating the cost of architectural solutions based on the AWS methodology. Architecture design and costing of the technology stack in AWS, GCP.

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

Table 2

### The list of laboratory studies

<b>Name of the topic and/or task</b>	<b>Contents.</b>
Topic 1. Lab 1	Development of IS components based on PaaS back4app
Topic 2. Lab 2	Virtualisation of microservice development environment based on Docker
Topic 3. Lab 3	Development of microservices based on Docker virtualisation technology with use of cloud-based GCP functions
Topic 4. Laboratory work 4	Using RESTful for web-based IS solutions
Topic 5. Lab 5	Development of the concept of IP architecture based on TOGAF
Topic 6. Lab 6	Designing the architecture and calculating the cost of a technology stack in AWS, GCP.

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

### List of self-studies

Name of the topic and/or task	Contents
Topic 1. Task 1.	Explore the peculiarities of software platforms development and the latest technologies for combining IT infrastructure components
Topic 2. Task 2.	Explore modern implementations of service-oriented systems (SOA)
Topic 3. Task 3.	Conduct a comparative analysis of AWS and GCP cloud services
Topic 4. Task 4.	Explore RESTful features for web-based IS solutions
Topic 5. Task 5.	Analyze the roles of the Architecture Development Method (ADM) performers
Topic 6. Task 6.	To conduct a comparative characterisation of the calculation of the cost of the technological stack in AWS and GCP.

The number of hours of lectures, laboratory classes and hours of independent work is given in the curriculum (technological map) for 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 teaching methods as:

Problem lecture (Topics 1 - 2), mini-lecture and discussion (Topics 3 - 6).

Visual (demonstration (Topics 1-6)).

Individual laboratory work (Topics 1 - 6), team laboratory work (Topic 5).

### 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 an exam: maximum amount is 60 points; minimum amount required is 35 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 courses 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 course, the following control measures are used:

Current control: defense of laboratory work (50 points), written tests (10 points).  
Semester control: Grading including Exam (40 points).  
More detailed information on the assessment system is provided in technological card of the course.

An example of an exam card and assessment criteria.

Semyon Kuznets Kharkiv National University of Economics  
The second (master's) level of higher education  
Specialty "126 "Information systems and technologies"  
Educational and professional program "Information systems and technologies".  
Semester II  
Educational course "IS STRATEGY"

## EXAM TASKS

**Task 1** (diagnostic, 17 points). Description of the structure of the IT strategy. An example of a business architecture and its components.

**Task 2** (heuristic, 23 points). You need to design and calculate the cost of an architecture based on AWS services: S3, Lambda, RDS, and EC2. The scenario involves creating a web application with the following requirements:

### **S3 (Simple Storage Service):**

It is used to store static content (images, CSS, JavaScript).

Total storage capacity: 100 GB.

S3 data transfer: 50 GB per month.

#### **1. Lambda:**

It is used to process requests coming from the frontend.

Number of calls: 1 million calls per month.

Average function execution time: 200 milliseconds.

Dedicated memory for the function: 512 MB.

#### **2. RDS (Relational Database Service):**

Used to store web application data.

Database type: MySQL.

Instance: db.t3.micro.

Storage capacity: 20 GB.

Traffic between the database and the application: 10 GB per month.

#### **3. EC2 (Elastic Compute Cloud):**

It is used for hosting.

Instance: t3.micro.

Working hours: constantly (24/7).



Approved at the meeting of the Department of Information Systems, Minutes No. 1 of 27 August 2024.

Examiner: Candidate of Economic Sciences, Associate Professor Serhii ZNAKHUR

Head of the Department, Candidate of Technical Sciences, Associate Professor Dmytro Bondarenko

### **Evaluation criteria**

The exam paper includes one diagnostic task and one heuristic task. In the process of completing the exam tasks, AWS and GCP cloud services are used. The maximum score is 40 points; the minimum score is 25 points. At the same time, the student receives a full mark for fully completed tasks:

**Task 1 is worth 17 points;**

**Task 2 is worth 23 points.**

**The final exam score is** the sum of the scores for all tasks, rounded to the nearest whole number according to the rules of mathematics.

**Task 1 (diagnostic)** is worth *17 points* as follows:

5 points - full description of the IT strategy structure;

10 points - a complete description of the business architecture structure;

7 points - examples are provided for all components of the business architecture.

**Task 2 (heuristic)** is worth *23 points* as follows:

10 points - description of the architecture components in AWS;

10 points - a description of all the parameters of components and services;

3 points - the result of the calculation of the cost of the IP architecture.

### **RECOMMENDED READING**

#### **Main**

1. Avramenko V.S., Avramenko A.S. Designing information systems: a textbook / V.S. Avramenko, A.S. Avramenko - Cherkasy: Cherkasy National University named after B. Khmelnytsky, 2017. - 434 p.
2. Handbook on Architectures of Information Systems / Peter Bernus, Kai Mertins, Gunter Schmidt. 2nd edition. - Berlin: Springer, 2006. - 886.
3. A Guide to the Business Analysis Body of Knowledge (BABOK Guide). - 3<sup>rd</sup> Edition. - IIBA, 2015. - 502 p.
4. Business Architecture Body of Knowledge (BIZBOK). URL: <http://www.businessarchitectureguild.org/Documents/Final.pdf>.
5. Stair R., Reynolds G. Fundamentals of Information Systems, Eighth Edition. Boston, Cengage Learning. 2014. - 540 p

## **Additional**

1. Znakhur S.V. IMPLEMENTATION AND RATING OF WEB-ANALYTICS SOLUTIONS BASED ON CLOUD SERVICES. Collection of scientific papers. X.: KhNADU. - 2022. - Issue 96. - P. 35-39.

<http://repository.hneu.edu.ua/bitstream/123456789/27384/1/%D0%92%D1%8B%D0%BF%D1%83%D1%81%D0%BA%2096.pdf>

2. Richardson L. RESTful Web APIs, [Electronic resource] / Leonard Richardson, Sam Ruby. O'Reilly's Open Book Project, 2007. - 448 p. - Mode of access: <http://restfulwebapis.org/rws.html>.

## **Information resources**

1. TOGAF: [www.togaf.org](http://www.togaf.org)

2. GCP calculator: <https://cloud.google.com/products/calculator>

3. AWS calculator: <https://calculator.aws/#/>