

**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

**ІТ-ІНФРАСТРУКТУРА**

**робоча програма навчальної дисципліни (РПНД)**

Галузь знань  
Спеціальність  
Освітній рівень  
Освітня програма

**12 "Інформаційні технології"  
126 "Інформаційні системи та технології"  
другий (магістерський)  
"Інформаційні системи та технології"**

Статус дисципліни  
Мова викладання, навчання та оцінювання

**вибіркова  
англійська**

Розробник:  
к.е.н., доцент

Сергій ЗНАХУР

Завідувач кафедри  
інформаційних систем

Дмитро БОНДАРЕНКО

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



Vice-rector for educational and  
methodological work

Karina NEMASHKALO

**IT INFRASTRUCTURE**

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>elective</b>
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Language	<b>english</b>
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Developers:

PhD in Economics,  
Associate Professor

Serhii ZNAKHUR

Head of the Department  
information systems

Dmytro BONDARENKO

Head of Study Programme

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Oleksandr KOLGATIN

**Kharkiv  
2024**

# INTRODUCTION

IT infrastructure management is based on the implementation of modern approaches to the organization and support of technological systems that ensure efficient business operation. The course examines the basic principles of IS architecture design, management and optimization of the IT infrastructure of the enterprise based on Gartner, the Meta Group methodology, and TOGAF. Special attention is paid to the management of IT resources. A significant emphasis is placed on the study of monitoring and automation methods to increase the efficiency of IT infrastructure management. The course "IT infrastructure" is devoted to the study of methods and means of building, managing and supporting the IT infrastructure of organizations. The main attention is paid to the development of IT infrastructure architecture, management of IT resources and ensuring their effective interaction with business processes of the enterprise. Students gain knowledge about the creation and maintenance of networks, servers, cloud services, databases and other infrastructure elements that ensure the uninterrupted operation of the IT environment of enterprises.

**Purpose of the course:** To develop students' competence in the field of design, management and optimization of the IT infrastructure of enterprises, as well as to teach how to implement modern technologies and tools to ensure the effective operation of IT systems.

**Subject of course:** Methods and technologies for managing the IT infrastructure of enterprises, organizing IT services and ensuring their smooth operation.

**Object of the educational course:** Development and management of the organization's IT infrastructure, which includes components of the IS architecture, a multi-component complex of optimally selected software and IT equipment.

**The objectives of the course are:**

1. To acquaint students with the basic concepts of IT infrastructure and the principles of its construction.
2. To study methods of management and monitoring of IT resources and services.
3. Consider the key components of an IT infrastructure, such as networks, servers, databases, storage, and other elements.
4. To study IT infrastructure risk management and HR management.
5. Master practical skills in infrastructure management based on modern tools and technologies (for example, cloud services, virtualization, automation).
6. Develop effective strategies for implementing and supporting the IT infrastructure of enterprises.

The learning outcomes and competences that the course forms are defined in table 1.

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

<b>Learning Outcomes</b>	<b>Competencies</b>
LO07	GK01,GK04
LO09	SK05, SK06

LO07. Making a grounded choice of project solutions and design a service-oriented information architecture of the enterprise (institution, organisation, etc.).

LO09. Developing and use data warehouses, to perform data analysis for supporting decision-making.

GC01. Ability to abstract thinking, analysis and synthesis.

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

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

SC06. Ability to manage information risks based on the concept of information security.

## COURSE CONTENT

### Content module 1. Basics of IT infrastructure

#### Topic 1. Interaction of business and information technologies

Information systems for business management: their features, functions and tasks. The role of information systems in modern enterprise management. Evolution of business management systems. Basic characteristics of modern information systems for enterprise management. Types of information systems that support management decision-making. Concept of system integration. Services of integrators that provide business solutions and their classification.

#### Topic 2. Enterprise architecture and its relationship with IT

Basic concepts of enterprise architecture. Enterprise as a system, including business processes and business systems. Definition of business systems and business processes, their classification. Process approach in enterprise management. The main components of business architecture: architecture of information, applications, technological infrastructure and communication with IT. An overview of modern architectural patterns such as Service-Oriented Architecture (SOA) and Model-Driven Architecture (MDA).

### **Topic 3. Methods of describing the enterprise architecture**

The main questions and challenges related to the description of the enterprise architecture. Overview of the main approaches to architecture modeling: Zachman models, Gartner IT architecture description, Meta Group methodologies, TOGAF, etc.

## **Content module 2. IS infrastructure management**

### **Topic 4. IT strategy of the enterprise**

Connection of the business strategy of the enterprise with the IT strategy. Key elements of IT strategy and stages of its development. Consideration of strategies in the field of IT personnel management and outsourcing.

### **Topic 5. Personnel management within the framework of IS infrastructure management**

The role of personnel in IT infrastructure management. Planning and organizing the work of the IT staff. Optimization of work processes. Advanced training and development of IT personnel. Change management and adaptation to new technologies. Monitoring the activity of IT personnel through a system of metrics. Development and application of BSC (Balanced Scorecard) to assess the effectiveness of IT infrastructure.

### **Topic 6. IT infrastructure management, audit and evaluation of the effectiveness of IT investments**

Basic methods of solving issues of management, auditing and evaluating the efficiency of investments in IT. Study of the ITIL library, ITSM approaches and their application to IT infrastructure management. Assessment of the cost of ownership of IT infrastructure (TCO). Evaluation of the maturity of IT processes and prospects of investments in IT.

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. Lab 1	Analysis and comparison of modern information systems
Topic 2. Lab 2	Description and modeling of business processes of development, implementation and support of IT infrastructure

Topic 3. Lab 3	Development of a company development model
Topic 4. Lab. 4	Development of enterprise architecture using TOGAF methodologies
Topic 5. Lab. 5	Optimizing the work of IT staff using the metrics system and the Balanced Scorecard
Topic 6. Lab. 6	Evaluation of the effectiveness of investments in IT infrastructure based on TCO calculation

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: Task 1.	Examples of application of the process approach in modern IT enterprises.
Topic 2. Task 2.	Study of practical cases of optimization of business processes in IT enterprises.
Topic 3. Task 3.	Analysis of the COBIT standard
Topic 4. Task 4.	Study of the basic requirements of ISO 9001 for IT organizations
Topic 5. Task 5.	Research on IT auditing standards
Topic 6. Task 6.	Analysis of IT spending methods

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 teaching methods as:

Problem lecture (Topics 1, 2, 3, 5, 6), mini-lecture and discussion (Topics 4).

Visual (demonstration (Topics 1-6)).

Individual laboratory work (Topics 1 - 6)



## 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 "IT INFRASTRUCTURE"

### EXAMINATION TICKET No. 1

**Task 1** ( diagnostic, 10 points) .

1. Describe the IT infrastructure management system based on the ITIL methodology. What key processes are part of this system?
2. Give an example of performance indicators for evaluating the IT infrastructure of an enterprise. Include at least five main indicators.

**Task 2** (heuristic, 30 points ).

Use simulation modeling to ensure optimization of the IT infrastructure management of the enterprise that provides data processing services. The main stages of work include:

1. Receiving requests for data processing. Intensity of incoming requests — 1 request (on average — every 5 minutes). The total number of requests is 500. Justify the amount of resources needed to process requests.
2. Processing requests. The average processing time for one request is 15 minutes, the median is 5 minutes. Estimate how many specialists are needed to process requests in a given period of time.
3. Data quality check. The average inspection time is 10 minutes, the standard deviation is 3 minutes. Determine how many QA specialists are needed to process all requests.
4. Sending results to customers. Time to prepare results for one request is 5 minutes. Estimate the time required to complete this process and determine how many resources are required to deliver results promptly.

Task: Based on the received data, build various scenarios and determine the optimal configuration of resources for each business process, taking into account the probability of delays and unexpected time costs.

Protocol No. 1 of August 27, 2024 was approved at the meeting of the Department of Information Systems.

Examiner, Doctor of Economics, Assoc. Serhii ZNAKHUR

Chief Department of Ph.D., Assoc. Dmytro BONDARENKO

**Evaluation criteria**

The examination ticket includes two heuristic tasks. Google Cloud and PowerBI cloud services are used in the process of performing exam tasks . The maximum number is 40 points; the minimum that is counted is 25 points. At the same time, for completely correctly completed tasks, the student receives:



**Task 1 – 10 points;**

**Task 2 – 30 points .**

**The final scores for the exam** consist of the sum of points for the completion of all tasks, rounded to a whole number according to the rules of mathematics.

**Task 1 ( diagnostic)** is estimated at **10 points** as follows:

5 points – implementation of the first task;

5 points – implementation of the second task;

**Task 2 (heuristic)** is valued at **30 points** as follows:

8 points – implementation of the first task;

8 points – implementation of the second task;

8 points – implementation of the third task;

6 points – implementation of the fourth task;

## **RECOMMENDED LITERATURE**

### **The main**

1. Ivanova, O. O. IT strategy in enterprise management: study guide. — Kyiv: KNEU, 2016. — 150 p.
2. Pustovit, V. V. Strategic management of information technologies: theory and practice. — Lviv: LNU named after I. Franka, 2018. — 200 p.
3. Kotlyar, O. V. Information systems in business management: study guide. — Kyiv: NTUU "KPI", 2015. — 192 p.
4. Levchuk, L. M., Dudka, O. V. Information technologies for business: a study guide. — Lviv: LNU named after I. Franka, 2017. — 160 p.
5. Netepchuk, V. V. Management of business processes: study guide. — Rivne: NUVHP, 2014. — 158 p.
6. Koval, O. S. Enterprise architecture: basics and methods: a study guide. — Kharkiv: Khnure, 2016. — 176 p.
7. Ryabokon, A. S., Logvin, M. A. Architecture of information systems: theory and practice. — Odesa: ONU, 2018. — 210 p.
8. Chechel, T. V. Personnel management in IT companies: training manual. — Kharkiv: Khnure, 2015. — 180 p.
9. Rybalko, O. V. Estimating the cost of ownership of information technologies (TCO): a study guide. — Lviv: LNU named after I. Franka, 2019. — 140 p.

10. Information systems and technologies: monograph / by General. ed. V. S. Ponomarenko. - Kh.: FOP Brovin O.V., 2019. - 212 p.  
<http://repository.hneu.edu.ua/handle/123456789/21743>

### **Additional**

1. Zachman, J. Enterprise Architecture: The Complete Modeling Guide. — Kyiv: Education of Ukraine, 2014. — 240 p.

### **Information resources**

1. TOGAF® 9.2, The Open Group Architecture Framework, 2018. — [Online]. Available: <https://www.opengroup.org/togaf>
2. Gartner, Inc. "Gartner IT Architecture Framework." — [Online]. Available: <https://www.gartner.com>
3. Meta Group. "Methodology for Enterprise Architecture." — [Online]. Available: <https://www.gartner.com>
4. ITIL Foundation, ITIL 4 Edition, 2019. — [Online]. Available: <https://www.axelos.com>