



Syllabus Course Program



Security of cloud technologies

Specialty

F5 – Cybersecurity and information protection

Institute

Educational and Scientific Institute of Computer Science and Information Technology

Educational program

Cybersecurity

Department

Cybersecurity (328)

Level of education

Bachelor's level

Course type

Profile, Selective

Semester

6

Language of instruction

English

Lecturers and course developers

**Maksym TOLKACHOV**

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Associate professor of the department of cybersecurity of National Technical University "Kharkiv Polytechnic Institute".

Author of more than 30 scientific and educational and methodological works. Leading lecturer in the disciplines: "Cybersecurity computer and telecommunication networks", "Design and administration of computer networks", "Technologies of transport networks", "System software of information communication systems", "Computer Network Administration", "Fundamentals of CISCO Industrial Certification"

[More about the lecturer on the department's website](#)

**Nataliia Dzheniuk**

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Associate professor of the department of cybersecurity of National Technical University "Kharkiv Polytechnic Institute".

The number of scientific publications: more than 31, including 2 utility model patents, more than 13 scientific works.

Cisco computer networks, cybersecurity, Internet of things, network protection and networking analytics. Leading lecturer on disciplines: "Security of cloud technologies"

[More about the lecturer on the department's website](#)

General information

Summary

The educational discipline "Security of cloud technologies" is an optional educational discipline. The course examines methods and means of ensuring information security and cloud information technologies used for its processing.

Course objectives and goals

Formation of students' knowledge system in the field of classical security techniques for today's cloud security problems. Ensuring the security of web services and solving problems that arise during its improvement. Analysis of the latest cloud security vulnerabilities using standard, systematic methods. Creating your own web service examples and security solutions for them.

Format of classes

Lectures, laboratory classes, consultations, self-study. Final control - exam.

Competencies

PC2. Ability to use information technologies, modern methods and models of cybersecurity and information security systems.

PC4. Ability to protect information in information systems according to the established cybersecurity policy and information protection.

PC6. Ability to implement and ensure the functioning of complex information protection systems (complexes of regulatory, organizational and technical means and methods, procedures, practical techniques, etc.).

PC10. The ability to monitor information processes, to analyze, identify, evaluate possible vulnerability and threats to information space and information resources in accordance with the established information security policy.

Learning outcomes

LO10. Be able to use modern information technologies, methods and models of cybersecurity and information security systems for professional activity.

LO12. Apply information security methods in information systems according to the established information security policy.

LO13. To implement, adjust, accompany and maintain the functioning of software and software and software and software security and information protection systems as necessary procedures for the functioning of information systems and \ or infrastructure of the organization as a whole.

LO16. To solve the problems of implementation and support of complex information protection systems in information systems.

LO21. To implement, support, analysis of efficiency of systems for detecting unauthorized access, actions with information in the information system, vulnerability, possible threats to information space and information resources and use protection complexes to ensure the required level of information security in information systems.

Student workload

The total volume of the course is 90 hours (3 ECTS credits): lectures - 24 hours, laboratory classes - 12 hours, self-study - 54 hours.

Course prerequisites

Antivirus protection of information.

Features of the course, teaching and learning methods, and technologies

In the course of teaching the discipline, the teacher uses explanatory-illustrative (informational-receptive) and reproductive teaching methods. Presentations, conversations, and master classes are used as teaching methods aimed at activating and stimulating the educational and cognitive activities of applicants.

Program of the course

Topics of the lectures

Topic 1. Introduction to cloud computing.

Subject, purpose and tasks of the discipline. Program learning outcomes. Definition of cloud computing. Characteristics of cloud computing. History and evolution of cloud computing. Advantages and disadvantages of cloud computing. Types of cloud computing. Options for using cloud computing. Cloud econometrics. Major cloud service providers and their services. Reference architecture of cloud computing.

Topic 2. Elementary basis of cloud computing.

Concept of virtualization. Types of virtualization. Concept of hypervisor. Types of hypervisors. Overview of hypervisors: Hyper-V, VMware, KVM. The concept of a virtual container. Classification of containers. Overview of tools for containerization: OpenVZ, LXC Linux Containers. Overview of the tool for implementing containers on the Linux OS - Docker. Overview of the tool for automating container management (orchestration) - Kubernetes. Java Virtual Machine.

Topic 3. Models of cloud computing.

Infrastructure as a Service (IaaS). Platform as a Service (PaaS). Software as a Service (SaaS). Function as a Service (FaaS).

Topic 4. Deployment models of cloud computing systems.

Private cloud (Private Cloud). Public cloud (Public Cloud). Hybrid cloud (Hybrid Cloud). High-performance computing in the clouds (NPC Cloud). Cloud of big data (Big Data Cloud).

Topic 5. Architecture and offers from leading companies providing cloud services.

Microsoft Azure cloud platform. Amazon Web Services cloud platform. Cloud platform IBM Cloud. Google Cloud Platform. Cloud PaaS platform Heroku. Cloud IaaS platform DigitalOcean. The local platform as an OpenShift Container Platform service. A complex of free software projects for creating the infrastructure of cloud services and OpenStack storage.

Topic 6. Security in cloud services.

Topic 7. Threats to security in the cloud and proposals for protection against them.

Topic 8. Using the Google Apps cloud service.

Google Drive storage, account, work with tables and documents.

Topic 9. Protection of the Google Apps cloud service.

Creating sites on Google Sites.

Topic 10. Protection of Google Apps cloud service.

Creating a form using Google Forms (advantages of using cloud services to create Internet surveys).

Topic 11. Using SkyDrive cloud environment (Microsoft service).

Creation of surveys (advantages of using cloud services to create Internet surveys).

Topic 12. Cloud-oriented package of Microsoft Office 365 programs and work in it.

Topic 13. Security analysis of Google Apps and Microsoft Office 365 cloud environments.

Topic 14: Deploying a website to Microsoft Azure using Application Services.

Topic 15. Working with relational data in Microsoft Azure.

Topic 16. Cloud technology for creating dynamic Prezi presentations.

Topics of the workshops

Not provided for in the curriculum

Topics of the laboratory classes

Topic 1. Overview of cloud service providers.

Topic 2. Basic models of providing cloud services and their implementation.

Topic 3. Data protection in the clouds.

Topic 4. Google cloud services. Google Docs/Google Drive protection.

Topic 5. Microsoft cloud services. One Drive protection.

Topic 6. Microsoft cloud services. Protecting Microsoft 365 Online.

Topic 7. Setting up the Microsoft Azure development environment.

Topic 8. Microsoft Azure SQL Database Protection.

Self-study

A student's independent work is one of the forms of organization of learning, the main form of mastering educational material in free time from classroom training. During independent work, students study

lecture material, do individual homework, prepare for tests, tests and exams. Students are also recommended additional materials (videos, articles) for self-study and analysis.

Non-formal education

Within the framework of non-formal education, according to the relevant Regulation (<http://surl.li/pxssv>), the educational component or its individual topics may be taken into account in the case of independent completion of professional courses/trainings, civic education, online education, vocational training, etc.

In particular, certain topics of this component can be taken into account in case of successful completion of the following CISCO courses:

PaloAlto (Cloud Security Fundamentals)

<https://paloaltonetworksacademy.net/course/index.php>.

Course materials and recommended reading

Basic literature:

1. Bhowmik S. Cloud Computing. Delhi : Cambridge University Press, 2017. 434 p.
https://books.google.com.ua/books/about/Cloud_Computing.html?id=jeTFDgAAQBAJ&redir_esc=y.
2. Cloud Computing : Principles, Systems and Applications I Editors Nick Antonopoulos and Lee Gillam; second ed. Swindon : Springer International Publishing AG, 2017. 410 p.
<https://download.e-bookshelf.de/download/0009/9634/13/L-G-0009963413-0020076340.pdf>.
3. Collier M., Shahan R. Microsoft Azure Essentials - Fundamentals of Azure / second ed. Redmond : Microsoft Press, 2016. 250 p.
https://books.google.com.ua/books/about/Microsoft Azure Essentials Fundamentals.html?hl=el&id=EfFxBgAAQBAJ&redir_esc=y.
4. Samuel Greengard, The Internet of Things (MIT Press Essential Knowledge series), ASIN: B00VB7I9VS, 2015, 230 P.
https://books.google.com.ua/books/about/The Internet of Things.html?id=oyyyBwAAQBAJ&redir_esc=y.
5. Aulov I.F., Study of the model of intrusions of key cloud systems and proposals for protection against them. Eastern European Journal of Advanced Technologies 5/2 (77) 2015, ISSN 1729-3774, DOI: 10.15587/1729-4061.2015.50912, - P.13.
[http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?I21DBN=LINK&P21DBN=UJRN&Z21ID=&S21REF=10&S21CNR=20&S21STN=1&S21FMT=ASP_meta&C21COM=S&S21P03=FILEA=&S21STR=Vej_pte_2015_5\(2\)_2](http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?I21DBN=LINK&P21DBN=UJRN&Z21ID=&S21REF=10&S21CNR=20&S21STN=1&S21FMT=ASP_meta&C21COM=S&S21P03=FILEA=&S21STR=Vej_pte_2015_5(2)_2).
6. Voytovych N.V., Naidyonova A.V. The use of Google cloud technologies and web 2.0 services in the educational process. Methodical recommendations. - Dnipro: DPTNZ "Dniprovsky center of PTOTS", 2017 - 113 p.
<https://online.fliphtml5.com/arbd/jejq/#p=1>.

Additional literature:

7. Ethem Alpaydin, Machine Learning: The New AI (MIT Press Essential Knowledge series), ASIN: B01M60Y1T7, 2016, 232P.
[https://dl.matlabiyar.com/siavash/ML/Book/Ethem%20Alpaydin-Introduction%20to%20Machine%20Learning-The%20MIT%20Press%20\(2014\).pdf](https://dl.matlabiyar.com/siavash/ML/Book/Ethem%20Alpaydin-Introduction%20to%20Machine%20Learning-The%20MIT%20Press%20(2014).pdf).
8. C Nayan B. Ruparelia, Cloud Computing (MIT Press Essential Knowledge series), ASIN: B01FLE5JH8, 2016, 258 P.

Assessment and grading

Criteria for assessment of student performance, and the final score structure

Points are awarded according to the following ratio:

- laboratory work: 30% of the semester grade;
- independent work: 10% of the semester grade;
- control work: 20% of the semester grade;
- exam: 40% of the semester grade.

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.

Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Approval

Approved by

17.01.2025

Head of the department
Serhii YEVSEIEV

17.01.2025

Guarantor of the educational
program
Serhii YEVSEIEV