Syllabus
Course Program

Web application development

Specialty
125 – 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
Special (professional), Mandatory

Semester
6

Language of instruction
English

Lecturers and course developers

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Candidate of Technical Sciences, senior researcher of the cyber security department of National Technical University "Kharkiv Polytechnic Institute".

The number of scientific publications: more than 60 publications, 25 articles in foreign publications and specialized publications of Ukraine, 6 patents for a useful model, guarantor of the educational and professional program of the first (bachelor) level of higher education. Leading lecturer in the disciplines: "Network Programming", "Development and Analysis of Algorithms", "Programming Technologies", "Programming Tools", "Web Security", "Fundamentals of Technical Information Protection", for undergraduate and graduate students.

More about the lecturer on the department's website

General information

Summary

The academic discipline "Web application development" is an optional academic discipline. The study of the discipline is aimed at students' assimilation of knowledge about modern approaches to building client-server Web applications, the basic concepts of ensuring the security of Web applications in the open Internet, as well as practical training of students in the development of such applications.

Course objectives and goals

Formation of students' system of theoretical knowledge and acquisition of practical abilities and skills in the development and design of web applications.

Format of classes

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

Competencies

PC-5. The ability to ensure the protection of information processed in information and telecommunication (automated) systems for the purpose of implementing the established information and/or cyber security policy.
PC-8. Ability to carry out incident management procedures, conduct investigations, provide them with an assessment.
PC-10. Ability to apply methods and means of cryptographic and technical protection of information at objects of information activity.

Learning outcomes

LO-9. Implement processes based on national and international standards for detection, identification, analysis and response to information and/or cyber security incidents.
LO-13. Analyze projects of information and telecommunication systems based on standardized technologies and data transmission protocols.
LO-14. Solve the task of protecting programs and information processed in information and telecommunication systems by hardware and software tools and evaluate the effectiveness of the quality of the decisions made.
LO-17. Ensure the processes of security and functioning of information and telecommunication (automated) systems based on practices, skills and knowledge, regarding structural (structural-logical) schemes, network topology, modern architectures and models of security of electronic information resources with a reflection of relationships and information flows, processes for internal and remote components.
LO-18. Use software and software-hardware complexes for the security of information resources.
LO-19. Apply theories and methods of protection to ensure information security in information and telecommunication systems.
LO-20. Ensure the functioning of special software to protect information from destructive software influences, destructive codes in information and telecommunication systems.
LO-21. Solve tasks of provision and support (including: review, testing, accountability) of the access control system according to the stated security policy in information and telecommunication (automated) systems.
LO-22. Solve the management procedures of identification, authentication, authorization of processes and users in information and telecommunication systems according to the established policy of information and/or cyber security.
LO-23. Implement measures to prevent unauthorized access to information resources and processes in information and telecommunication (automated) systems.
LO-24. Solve the problems of managing access to information resources and processes in information and telecommunication (automated) systems based on access management models (mandatory, discretionary, role-based).
LO-25. Ensure the introduction of accountability of the access management system to electronic information resources and processes in information and telecommunication (automated) systems using event registration logs, their analysis and stated protection procedures.
LO-26. Implement measures and ensure the implementation of processes of prevention of unauthorized access and protection of information, information and telecommunication (automated) systems based on the reference model of interaction of open systems.
LO-27. Solve problems of data flow protection in information and telecommunication (automated) systems.
LO-28. Analyze and evaluate the effectiveness and level of security of resources of various classes in information and telecommunication (automated) systems during tests in accordance with the established policy of information and/or cyber security.
LO-29. Evaluate the possibility of realization of potential threats of information processed in information and telecommunication systems and the effectiveness of the use of complexes of protection means under the conditions of realization of threats of various classes.
LO-31. Apply protection theories and methods to ensure the security of elements of information and telecommunication systems.
LO-32. Solve the tasks of managing the processes of restoring the regular functioning of information and telecommunication systems using backup procedures in accordance with the stated security policy.

LO-33. Solve the problems of ensuring the continuity of business processes of the organization on the basis of risk management theory.
LO-34. Participate in the development and implementation of an information security and/or cyber security strategy in accordance with the goals and objectives of the organization.
LO-35. Solve the tasks of providing and supporting complex information security systems, as well as countering unauthorized access to information resources and processes in information and information-telecommunication (automated) systems in accordance with the stated policy of information and/or cyber security.
LO-36. Detect dangerous signals of technical means.
LO-37. Measure the parameters of dangerous and interfering signals during the instrumental control of information security processes and determine the effectiveness of information security against leakage through technical channels in accordance with the requirements of regulatory documents of the technical information security system.
LO-38. Interpret the results of special measurements using technical means, monitoring the characteristics of information and telecommunication systems in accordance with the requirements of regulatory documents of the technical information security system.
LO-39. Carry out attestation (based on accounting and survey) of regime territories (zones), premises, etc. under the conditions of compliance with the secrecy regime, recording the results in the relevant documents.
LO–40. Interpret the results of special measurements using technical means, control of ITS characteristics in accordance with the requirements of regulatory documents of the technical information security system.
LO-41. Ensure the continuity of the event and incident logging process based on automated procedures.
LO-42. Implement processes of detection, identification, analysis and response to information and/or cyber security incidents.
LO-43. Apply national and international regulatory acts in the field of information security and/or cyber security to investigate incidents.
LO-44. Solve the problems of ensuring the continuity of the organization's business processes on the basis of risk management theory and the stated information security management system, in accordance with national and international requirements and standards.
LO-45. Apply early classes of information security and/or cyber security policies based on risk-based access control to information assets.
LO-46. Analyze and minimize the risks of information processing in information and telecommunication systems.
LO-47. Solve the problems of protection of information processed in information and telecommunication systems using modern methods and means of cryptographic protection of information.
LO-48. Implement and maintain intrusion detection systems and use cryptographic protection components to ensure the required level of information security in information and telecommunications systems.
LO-49. Ensure the proper functioning of the monitoring system of information resources and processes in information and telecommunication systems.
LO-50. Ensure the functioning of software and software-hardware complexes for detecting intrusions of various levels and classes (statistical, signature, statistical-signature).
LO-51. Maintain operational efficiency and ensure configuration of intrusion detection systems in information and telecommunication systems.
LO-52. Use tools for monitoring processes in information and telecommunication systems.
LO-53. Solve problems of software code analysis for the presence of possible threats.

Student workload

The total volume of the course is 180 hours (6 ECTS credits): lectures - 36 hours, laboratory classes - 36 hours, self-study - 108 hours.

Course prerequisites

Basics of programming. Programming technologies. Programming tools.

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. Basics of design and development of web applications.
Subject and object of the course. Composition and purpose of the software. Architecture of software systems. Web development tools. Integrated development environments. Client/server web application architecture. Overview of technologies. Web standards.
Topic 2. The language of hypertext markup of web pages.
The essence of hypertext. Development of HTML standards. HTML layers. The concept of the HTML language. The structure of an HTML document. Structure of HTML code. Language objects. Basic tags and their use. Creation of a website based on a template. Types of site templates. HTML templates. The concept of layout. Structures of websites. Work with frames.
Topic 3. Using cascading style sheets.
The concept of cascading style sheets. CSS version history. Relationships between multiple nested elements. Creating CSS styles. The relationship between HTML and CSS. Rules for writing CSS. Cascading CSS.
Topic 4. Design and development technologies of web applications.
Introduction to JavaScript: basic concepts and definitions. Methods of connecting JavaScript to HTML documents. Scripting and HTML collaboration. Features of interaction with browsers. Peculiarities of taking into account the type of browser. Operations and managing structures. Development technologies of web-oriented information systems. Web servers in information systems and their settings.
Topic 5. Database management systems and their use in the design and development of web applications.
The principle of operation of the database. Organization of interaction with databases. User identification procedures.
Topic 6. Support of web applications.
Creation of web-oriented systems. Protection of information.

Topics of the workshops

Not provided for in the curriculum.

Topics of the laboratory classes

Topic 1. Basics of design and development of web applications.
Topic 2. The language of hypertext markup of web pages.
Topic 3. Using cascading style sheets.
Topic 4. Design and development technologies of web applications.
Topic 5. Database management systems and their use in the design and development of web applications.
Topic 6. Support of web applications.

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:
Java 1
https://www.netacad.com/catalogs/learn?category=course.

Course materials and recommended reading

Basic literature:

1. Learning web development [Electronic resource]. - Access mode: https://developer.mozilla.org/ru/docs/Learn.
2. CYBER SECURITY: WEB technologies [Electronic resource]: Training and reference manual / S.P. Yevseev, A.M. Tkachev, V.O. Alexiev, Yu.M. Ryabukha – Kharkiv: KHNEU named after S. Kuznetsia, - Lviv: "Novyi Svit-2000" Publishing House, 2021. - 390 p. (Ukrainian language).
https://drive.google.com/drive/u/1/folders/1wOTN8N-GBGO06AnvjQHU1SdBl3xCaUju
3. MySQL Tutorial [Electronic resource]. – Access mode: https://www.tutorialspoint.com/mysql/index.htm.
4. Java EE Tutorials [Electronic resource]. – Access mode: https://www.oracle.com/java/technologies/jee-tutorials.html.

Additional literature:

1. Tutorials Library [[Electronic resource]. – Access mode: https://www.tutorialspoint.com/index.htm.

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: 10% of the semester grade;
- course project: 20% of the semester grade;
- exam: 30% 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	28.08.2024		Head of the department Serhii YEVSEIEV
	28.08.2024		Guarantor of the educational program Serhii YEVSEIEV