

# PROJECT WORKSHOP

## COURSE SYLLABUS

<b>Code and name of specialty</b>	121 Software Engineering 122-Computer Science 126-Information Systems and technologies	<b>Institute</b>	Faculty of Computer Science and Software Engineering
<b>Program name</b>	Software Engineering Computer Science and Intelligent Systems Information Systems Software	<b>Department</b>	Software Engineering and Management Information Technologies
<b>Type of program</b>	Educational and Professional	<b>Language of instruction</b>	Ukrainian

## LECTURER

**Name and surname, email** **Andrii Pashnev, [Andrey.Pashnev@khpi.edu.ua](mailto:Andrey.Pashnev@khpi.edu.ua)**



Ph.D. (Technical). Senior Researcher. Associate Professor at the Department of Software Engineering and Management Information Technology. Author (co-author) of more than 140 research papers and textbooks, 4 collective monographs, 20 textbooks, stamped by the university, 28 scientific articles, 51 research report and 2 utility model patents (h-index = 4, i10-index = 4 in Google Scholar – <https://scholar.google.com/citations?user=KcBe4YwAAAAJ&hl=ru>; ORCID ID is <https://orcid.org/0000-0002-9150-6108>).  
Basic courses: " Fundamentals of computer networks " and " Project workshop ".

## GENERAL DESCRIPTION OF THE COURSE

<b>Summary</b>	The course " Project workshop " is an academic discipline from the profiled package of disciplines 03 "Innovation Campus". It is taught in the seventh semester in the amount of 120 hours (4 ECTS credits), in particular: lectures –16 hours, laboratory classes – 16 hours, independent work –88 hours. There are no individual tasks. The study of the discipline ends with the test.
<b>Course objectives</b>	Providing students with knowledge and skills in designing a web application in accordance with certain requirements, the selection and application of effective technologies for its implementation, the acquisition of practical skills in creating a software system.
<b>Types of classes and control</b>	Lectures, laboratory classes, independent work. Current control - laboratory classes, intermediate modular control. The course ends with a final test.
<b>Term</b>	7

<b>Student workload (credits) / Type of course</b>	7 / Selective	<b>Lectures (hours)</b>	16	<b>Workshops (hours)</b>	16	<b>Self-study (hours)</b>	88
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<b>Program competences</b>	121-GC02. Ability to apply knowledge in practical situations. 121-PC14. Ability to participate in software design, including modeling (formal description) of its structure, behavior and functioning processes. 121-PC15. Ability to develop architectures, modules and components of software systems. 121-PC16. Ability to formulate and provide software quality requirements in accordance with customer requirements, specifications and standards. 121-PC17. Ability to adhere to specifications, standards, rules and recommendations in the professional field in the implementation of life cycle processes. 121-PC20. Ability to apply fundamental and interdisciplinary knowledge to successfully solve software engineering problems 121-PC23. Ability to implement phases and iterations of the life cycle of software systems and information technology based on appropriate models and
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approaches to software development.

121-PC25. Ability to reasonably select and master software development and maintenance tools.

122-GC01. Ability to abstract thinking, analysis and synthesis.

122-GC02. Ability to apply knowledge in practical situations.

122-GC03. Knowledge and understanding of the subject area and understanding of professional activity.

122-GC06. Ability to learn and master modern knowledge.

122-GC08. Ability to generate new ideas (creativity).

122-GC09. Ability to work in a team.

122-GC10. Ability to be critical and self-critical.

122-GC11. Ability to make informed decisions.

122-GC12. Ability to evaluate and ensure the quality of work performed.

122-GC13. Ability to act on ethical considerations.

122-GC14. Ability to exercise their rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine.

122-GC15. Ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, techniques and technologies. active recreation and leading a healthy lifestyle.

122-PC01. Ability to mathematically formulate and study continuous and discrete mathematical models, justify the choice of methods and approaches for solving theoretical and applied problems in the field of computer science, analysis and interpretation.

122-PC07. Ability to apply the theoretical and practical foundations of methodology and modeling technology to study the characteristics and behavior of complex objects and systems, to conduct computational experiments with processing and analysis of results.

122-PC08. Ability to design and develop software using different programming paradigms: generalized, object-oriented, functional, logical, with appropriate models, methods and algorithms of calculations, data structures and control mechanisms.

122-PC09. Ability to implement a multi-tier computing model based on client-server architecture, including databases, knowledge and data warehouses, perform distributed processing of large data sets on clusters of standard servers to meet the computing needs of users, including cloud services.

122-PC10. Ability to apply methodologies, technologies and tools to manage the life cycle processes of information and software systems, information technology products and services in accordance with customer requirements.

122-PC11. Ability to data mining based on methods of computational intelligence, including large and poorly structured data, their prompt processing and visualization of analysis results in the process of solving applied problems.

122-PC14. Ability to apply methods and means of information security, to develop and operate special software for protection of information resources of critical information infrastructure.

122-PC15. Ability to analyze and functional modeling of business processes, construction and practical application of functional models of organizational, economic and production-technical systems, methods of risk assessment of their design.

126-GC02. Ability to apply knowledge in practical situations.

126-GC03. Ability to understand the subject area and professional activity.

126-GC06. Ability to search, process and summarize information from various sources.

126-GC07. Ability to develop and manage projects.

126-GC08. Ability to evaluate and ensure the quality of work performed.

126-PC01. Ability to analyze the object of design or operation and its subject area.

126-PC02. Ability to apply standards in the field of information systems and technologies in the development of functional profiles, construction and integration of systems, products, services and infrastructure elements of the organization.

126-PC03. Ability to design, develop, debug and improve system, communication and software and hardware of information systems and technologies, the Internet of Things (IoT), computer-integrated systems and system network structure, their management.

126-PC04. Ability to design, develop and use tools for the implementation of information systems, technologies and infocommunications (methodological, informational, algorithmic, technical, software and others).

126-PC12. Ability to manage and use modern information and communication systems and technologies (including those based on the use of the Internet).

Learning outcomes	Teaching and learning methods	Forms of assessment (continuous assessment CAS, final assessment FAS)
121-PLO 03. Know the basic processes, phases and iterations of the software life cycle.	<p>Problem lectures, mini-lectures, work in small groups, presentations, laboratory classes (with elements of seminar discussion), business and role-playing games, case method.</p>	<p>Written individual assignments for laboratory works (CAS), assessment of knowledge in laboratory classes (CAS), express surveys (CAS), online tests (CAS), final/semester control in the form of a semester test, according to the schedule of the educational process (FAS).</p>
121-PLO 04. Know and apply professional standards and other legal documents in the field of software engineering.		
121-PLO 06. Ability to choose and use the methodology of creating software appropriate to the task.		
121-PLO 09. Know and be able to use methods and tools for collecting, formulating and analyzing software requirements.		
121-PLO 10. Conduct a pre-project survey of the subject area, systematic analysis of the design object.		
121-PLO 11. Choose source data for design, guided by formal methods of describing requirements and modeling.		
121-PLO 12. Apply effective approaches to software design in practice.		
121-PLO 13. Know and apply methods of algorithm development, software design and data and knowledge structures.		
121-PLO 14. Apply in practice the tools of domain analysis, design, testing, visualization, measurement and documentation of software.		
121-PLO 15. Motivated to choose programming languages and development technologies to solve problems of software creation and maintenance.		
121-PLO 17. Be able to apply methods of component software development.		
121-PLO 19. Know and be able to apply		

methods of software verification and validation.

121-PLO 20. Know approaches to evaluating and ensuring software quality.

121-PLO 23. Be able to document and present the results of software development.

122-PLO 09. Develop software models of subject environments, choose a programming paradigm from the standpoint of convenience and quality of application for the implementation of methods and algorithms for solving problems in the field of computer science.

122-PLO 10. Use tools for developing client-server applications, design conceptual, logical and physical models of databases, develop and optimize queries to them, create distributed databases, repositories and showcases of databases, knowledge bases, including on cloud services, using web languages -programming.

122-PLO 11. Have the skills to manage the life cycle of software, products and services of information technology in accordance with the requirements and restrictions of the customer, be able to develop project documentation (feasibility study, terms of reference, business plan, agreement, contract, contract).

122-PLO 13. Know the languages of system programming and methods of program development that interact with the components of computer systems, know network technologies, computer network architectures, have practical skills in the technology of computer network administration and their software.

122-PLO 15. Understand the concept of information security, the principles of secure software design, ensure the security of computer networks in conditions of incomplete and uncertain source data.

122-PLO 16. Perform parallel and distributed calculations, apply numerical methods and algorithms for parallel structures, parallel programming languages in the development and operation of parallel and distributed software.

126-PLO 02. Apply knowledge of basic and natural sciences, systems analysis and modeling technologies, standard algorithms and discrete analysis in solving problems of design and use of information systems and technologies.

126-PLO 03. To use basic knowledge of informatics and modern information systems and technologies, programming skills, technologies of safe work in computer networks, methods of creation of databases and Internet resources, technologies of development of algorithms and computer programs in high-level languages with application of object-oriented programming to solve problems of design and use of information systems and technologies.

126-PLO 04. Conduct a systematic analysis of design objects and justify the choice of structure, algorithms and methods of information transfer in information systems and technologies.

126-PLO 05. Argue the choice of software and hardware for the creation of information systems and technologies based on the analysis of their properties, purpose and technical characteristics, taking into account the requirements for the system and operating conditions; have the skills to debug and test software and hardware of information systems and technologies.

126-PLO 06. Demonstrate knowledge of the current level of information systems technology, practical skills of programming and use of applied and specialized computer

systems and environments for their implementation in professional activities.

126-PLO 08. Apply the rules of design materials for information systems and technologies, know the composition and sequence of design work, taking into account the requirements of relevant legal documents for implementation in professional activities.

## ASSESSMENT AND GRADING

	Total score (points) for all types of learning activities	ECTS grading scale	The national grading scale	
Ranges of points corresponding to grades	90-100	A	excellent	Allocation of grade points 100% Final assessment as a result of Final test (30%) and Continuous assessment (70%). 30% Final test. 70% Continuous assessment: - 40% of assessment of tasks in laboratory classes; - 30% intermediate control (the first modular control work - 10%, the second modular control work - 20%).
	82-89	B	good	
	74-81	C		
	64-73	D	satisfactory	
	60-63	E		
	35-59	FX		
	0-34	F	Unsatisfactory (with mandatory repetition of the course)	

### Course policy

Students must attend all classes according to the study schedule and adhere to the norms of academic ethics. To study the course, students need to have their personal computer and (or) use computers of the computer center at the department. Students must work with compulsory and recommended reading, including Internet resources. Students must complete and submit all laboratory works during the semester in which the course is taught, before the examination session. The final assessment is not carried out without the personal presence of students.

## COURSE STRUCTURE AND CONTENT

Topic	Laboratory work		Self-study
<b>Topic 1</b>	<b>Laboratory work 1</b>	Overview of the essence of the subject area of the project. Creating the necessary classes and methods	Familiarization with the requirements of the Java Code Convention
<b>Topic 2</b>	<b>Laboratory work 2</b>	Creating a relational database for a web application using MySQL or PostgreSQL and providing access to data	Introduction to the Java Database Connectivity Application Programming Interface (JDBC API) specification
<b>Topic 3</b>	<b>Laboratory work 3</b>	Implement a web application architecture using an MVC schema and design templates	Introduction to design templates (Team, Strategy, Factory, Builder, Singleton, Front controller, Observer, Adapter) and JavaScript Frameworks (Bootstrap, Materialize)

<b>Topic 4</b>	Create dynamic web application components	<b>Laboratory work 4</b>	Implement user request processing using servlets and Java Server Pages technology, create tags and provide protection against re-sending data to the server when updating a web page	Learn about tag assignment from the standard JSTL library and session, filter, and listener applications
<b>Topic 5</b>	Web page pagination, data validation and exception handling	<b>Laboratory work 5</b>	Implementation of web page pagination, data validation and exception handling	Introduction to the concept of stack trace
<b>Topic 6</b>	Secure access to web application data	<b>Laboratory work 6</b>	Implementation of authentication and authorization, delimitation of user access rights, password encryption, creation of captcha	Introduction to the means of authentication and authorization, delimitation of user access rights, password encryption, the concept of captcha
<b>Topic 7</b>	Procedure for creating an event log using the log4j library	<b>Laboratory work 7</b>	Implementation of the event log using the log4 library	Acquaintance with the log4 library
<b>Topic 8</b>	Procedure for testing the developed web application	<b>Laboratory work 8</b>	Testing the developed web application using modular and integration tests	Introduction to the possibilities of modular and integration testing

**RECOMMENDED READING**

1. Mulesa, O. Yu. (2018). Information systems and relational databases: Textbook. Electronic edition, 118 p.
2. Dronov, V. A. (2016). PHP, MySQL, HTML5 and CSS 3. Development of modern dynamic Web-sites. Moscow: BKHV-Peterburh, 399 p.
3. Thomson, L. (2017). Development of Web-applications for PHP and MySQL: Per. from English. 4th ed., Corrected. SPb: "DyaSoftYUP", 672 p.
4. Prokhorenok, N. (2019). HTML, JavaScript, PHP and MySQL. Gentleman's set of Web-master. Moscow: BKHV-Peterburh, 912 p.
5. Wagner Gerd, Diaconescu Mircea. (2017). Building Back-End Web Apps with Java, JPA and JSF. web-engineering. info, 161 p.
6. Karthik, P. (2019). Web Applications using JSP (Java Server Page): Develop a fully functional web application. BPB Publications, 988 p.
7. Murach Joel, Urban Michael, Mike Murach. (2014). Murach's Java Servlets and JSP. 3rd Edition. Associates, 758 p.
8. Basham, B., Sierra, K., Bates, B. (2008). Head First Servlets and JSP. Second Edition. O'Reilly Media. Inc., 498 p.
9. Hunter Jason, Crawford William. (2001). Java Servlet Programming: Help for Server Side Java Developers (Java Series) Second Edition. O'Reilly Media, 782 p.
10. Khairova N. F., Petrasova S. V. (2020). Modern technologies of Web-programming: textbook. Manual. / Nat. tech. University. Kharkiv Polytechnic Institute. Kharkiv: Panov A. M., 112 p.
11. Evseev, S. P., Ostapov, S. E., King, O. G. (2019). Cybersecurity: modern security technologies. A textbook for students of higher educational institutions. Lviv: "New World-2000", 678 p.
12. Graham, D., Veenendaal, E., Evans, I., Black, R. (2018). Foundations of software testing. istqb certification. Thomson.

1. Adrian W. West, Steve Prettyman. (2018). Practical PHP 7, MySQL 8, and MariaDB Website Databases: A Simplified Approach to Developing Database-Driven Websites. Apress, 546 p.
2. Chintan Mehta et al. (2018). MySQL 8 Administrator's Guide: Effective guide to administering high-performance MySQL 8 solutions, Packt Publishing Ltd, 510 p.
3. Preston Zhang. (2017). Practical Guide for Oracle SQL, T-SQL and MySQL, CRC Press, 202 p.
4. Kishori Sharan. (2014). Beginning Java 8 APIs, Extensions and Libraries: Swing, JavaFX, JavaScript, JDBC and Network Programming APIs (Expert's Voice in Java). 1st Edition. Apress, 808 p.
5. Tashkov Petro. (2016). Web mastering HTML, CSS, JavaScript, PHP, CMS, AJAX, promotion. Moscow: Book on demand, 512 p.
6. Darnell, R. (2020). JavaScript: a guide. St. Petersburg: "Peter", 192 p.
7. Kulikov, S. (2021). Software testing. Basic course. EPAM Systems.

## INFORMATION RESOURCES ON THE INTERNET

1. Java Code Conventions. [Electronic resource]. Access mode: <https://www.oracle.com/technetwork/java/codeconventions-150003.pdf>.
2. MySQL Guide. [Electronic resource]. Access mode: <http://www.mysql.ru/docs/man>.
3. Basics of JDBC. [Electronic resource]. Access mode: <https://docs.oracle.com/javase/tutorial/jdbc/basics/index.html>.
4. The MVC Framework Handbook. [Electronic resource]. Access mode: [https://www.tutorialspoint.com/mvc\\_framework/index.htm](https://www.tutorialspoint.com/mvc_framework/index.htm).
5. Textbooks on frameworks for Java collections. [Electronic resource]. Access mode: <https://o7planning.org/11039/java-collections-framework>.
6. Bootstrap Tutorials. [Electronic resource]. Access mode: <https://o7planning.org/11745/bootstrap>.
7. Textbooks on Java / Jsp servlet. [Electronic resource]. Access mode: <https://o7planning.org/10979/servlet-jsp>.
8. Tutorials from Java application servers. [Electronic resource]. Access mode: <https://o7planning.org/11587/java-application-servers>.

## ACADEMIC INTEGRITY

Students are expected to adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI".

The content of this syllabus is consistent with the course program.