DEVELOPMENT OF CORPORATE INFORMATION SYSTEMS

COURSE SYLLABUS

Code and name of specialty	121 Software Engineering 122 Computer Science 126 Information Systems and Technologies	**Institute**	**Computer Sciences and Software Engineering**
Program name	Software Engineering Computer Science and Intelligent Systems Information Systems Software	**Department**	Software Engineering and Management Information Technologies
Type of program	**Educational and Professional**	**Language of instruction**	**Ukrainian, English**

LECTURER

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PhD, Candidate of Engineering Sciences, Associate Professor of Department of Software Engineering and Information Technology Management. Number of scientific and educational publications more than 25 research papers and textbooks (Google Scholar: https://scholar.google.com.ua/citations?hl=ru&user=ShYWpZYAAAAJ; ORCID: https://orcid.org/0000-0002-4689-3356; Scopus: https://www.scopus.com/authid/detail.uri?authorId=57194776447)

Leading lecturer of the courses: Development of corporate information systems (part 1 and part 2) *(Bachelors) (Ukrainian, English)*

Databases for corporate information systems *(Bachelors) (Ukrainian, English)*

GENERAL DESCRIPTION OF THE COURSE

Summary	The course “Development of corporate information systems” is an optional course in the profiled discipline package 03 “Innovation campus” of the specialties 121 “Software Engineering”, 122 “Computer Science”, and 126 “Information Systems and Technologies”. It is taught in the third and fourth semesters in the amount of 300 hours (10 ECTS credits), in particular: lectures – 64 hours, laboratory classes – 64 hours, independent work – 172 hours. The course includes 2 content modules and 2 tests. The study of the discipline ends with the test.
Course objectives	Formation of students' in-depth knowledge of the theory and skills of practical development of information systems to ensure the work of large enterprises, corporations and other business structures of any industry and forms of ownership.
Types of classes and control	Lectures, laboratory works, control works, self-study. The course ends with a final exam
Term	3, 4

Student workload (credits) / Type of course	10 / Optional	**Lectures (hours)**	64	**Workshops (hours)**	64	**Self-study (hours)**	172

Program competen	121-GC01. Ability to abstract thinking, analysis and synthesis. 121-GC 02. Ability to apply knowledge in practical situations.

ces	121-GC 05. Ability to learn and master modern knowledge. 121-GC 06. Ability to search, process and analyze information from various sources. 121-GC 07. Ability to work in a team. 121-PC13. Ability to identify, classify and formulate software requirements. 121-PC14. Ability to participate in software design, including modelling (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 ensure software quality requirements in accordance with customer requirements, specifications and standard. 121-PC17. Ability to adhere to specifications, standards, rules and recommendations in the professional field in the implementation of life cycle processes. 121-PC19. Knowledge of information data models, the ability to create software for data storage, retrieval and processing. 121-PC24. Ability to carry out the system integration process, apply change management standards and procedures to maintain the integrity, overall functionality and reliability of the software. 122-GC1. Ability to abstract thinking, analysis and synthesis. 122-GC2. Ability to apply knowledge in practical situations. 122-GC3. Knowledge and understanding of the subject area and understanding of professional activity. 122-GC6. Ability to learn and master modern knowledge. 122-GC9. Ability to work in team. 122-PC8. 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 management mechanisms. 122-PC9. Ability to implement a multi-tier computing model based on the client-server architecture, including databases, knowledge bases, 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. 126-GC 1. Ability to abstract thinking, analysis and synthesis. 126-GC 2. Ability to apply knowledge in practical situations. 126-GC 3. Ability to understand the subject area and professional activity. 126-GC 5. Ability to learn and master modern knowledge. 126-GC 6. Ability to search, process and summarize information from various sources. 126- GC 8. Ability to evaluate and ensure the quality of work performed. 126-PC 1. Ability to analyze the object of design or operation and its subject area. 126-PC 2. 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-PC 3. 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- PC 4. Ability to design, develop and use tools for the implementation of information systems, technologies and infocommunications (methodological, informational, algorithmic, technical, software and others). 126-PC 5. Ability to assess and take into account economic, social, technological and environmental factors at all stages of the life cycle of infocommunication systems. 126-PC 8. Ability to manage the quality of products and services of information systems and technologies during their life cycle. 126-PC 12. 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-PO03. Know the basic processes, phases and iterations of the software life cycle.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, method of feedback from students, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
121-PO04. Know and apply professional standards and other regulatory documents in the field of software engineering.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, project training	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
121-PO08. Be able to develop a human-machine interface.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the

		learning process schedule (FAS)
121-PO09. Know and be able to use methods and tools for collecting, formulating and analyzing software requirements.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
121-PO10. Conduct a pre-project survey of the subject area, systematic analysis of the design object.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
122-PLO9. Develop software models of subject areas, choose a programming paradigm from the standpoint of convenience and quality of its application to implement methods and algorithms that solve problems in the computer science field.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
122-PLO10. Use tools for developing client-server applications, design conceptual, logical, and physical models of databases, develop and optimize database queries, create distributed databases, repositories and showcases of databases, and knowledge bases, including those based on cloud services, using web programming languages.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
126-PLO 3. To use basic knowledge of informatics and modern information systems and	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research,	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual

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 project-oriented programming to solve problems of design and use of information systems and technologies.	problem-based learning	assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
126-PLO 4. Conduct a systematic analysis of design objects and justify the choice of structure, algorithms and methods of information transfer in information systems and technologies.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
126-PLO 5. 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.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
126- PLO 6. 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	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the

implementation in professional activities.		learning process schedule (FAS)
126- PLO 7. Justify the choice of technical structure and develop appropriate software that is part of information systems and technologies.	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)
126- PLO 8. Apply the rules of design materials of 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	Interactive lectures with presentations, discussions, practical classes, teamwork, case method, research, problem-based learning	Written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), collection of data on individual assignments and reporting on research results (CAS), final / semester control in the form of a semester exam, according to the learning process schedule (FAS)

ASSESSMENT AND GRADING

Ranges of points corresponding to grades

Total score (points) for all types of learning activities	ECTS grading scale	The national grading scale
90-100	A	excellent
82-89	B	good
74-81	C	
64-73	D	satisfactory
60-63		
35-59	FX	Unsatisfactory (with the exam retake option)
0-34	F	Unsatisfactory (with mandatory repetition of the course)

Allocation of grade points

100% **final assessment** in the form of test (30%) and current assessment (70%).

70% **continuous assessment**:

- 45% assessment of tasks in laboratory work (15% for each work);
- 25% intermediate control (control tasks and individual tasks)

Course policy	Follow the rules of the University internal regulations. Take an active part in the learning process. 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

Semester 1					
Topic 1	Basic concepts of corporate information systems	**Laboratory work** 1	Subject area analysis and formation of requirements to the corporate information system	**Self-Study**	Imperative programming. Procedural programming imperative programming languages. Declarative programming. Functional programming. Logic programming. Object-oriented programming. Event-driven programming. Parallel computing. Component-based programming.
Topic 2	Organization principles of corporate information systems	**Laboratory work** 2	Design and development of corporate information system modules		Agile manifesto. Principles of agile software development. Agile methods.
Topic 3	Features of corporate information systems architecture	**Laboratory work** 3	Development of a prototype user interface		Strategic management in corporate information systems
Topic 4	Design of corporate information systems				
Topic 5	Features of development of corporate information systems				
Semester 2					
Topic 1	Implementation of corporate information systems	**Laboratory work** 1	Development of a database model in accordance with the architecture of the corporate information system	**Self-Study**	Test cases and test design techniques
Topic 2	Migration in corporate information systems	**Laboratory work** 2	Development of tests for the analysis of work of the corporate information system		Modern standards of project management. Use of three-dimensional modeling systems. Software. MS Project.
Topic 3	Quality assurance of corporate information systems	**Laboratory work** 3	Development of a reference system of a corporate information system.		
Topic 4	Support and maintenance of corporate information system				

RECOMMENDED READING

Compulsory

1. Татарчук, М. І. (2014). Корпоративні інформаційні системи: підручник. Київ: КНЕУ, 329 с.
2. Langer, A. M. Guide to Software Development: Designing and Managing the Life Cycle. Second Edition. Springer. 419 p.
3. A Guide to the Project Management Body of Knowledge (PMBOK Guide): 2000. Project Management Institute. Inc. Newtown Square. PA 19073-3299 USA.
4. Ушакова, І. О. (2015). Проектування інформаційних систем: практикум. Харків: Вид. ХНЕУ, 344 с.
5. Greasley. A., Hickie, S., Bocij. P. (2018). Business Information Systems: Technology, Development and Management for the Modern Business 6th edition. Pearson Education UK, 630 p.
6. Harper, R. (2016). Practical Foundation of Programming Languages. Second edition. Carnegie Mellon University, 580 p.
7. Ledin, J. (2020). Modern Computer Architecture and Organization. Packt Publishing, 514 p.
8. Roshen, W. (2010). SOA-Based Enterprise Integration: A Step-by-Step Guide to Services-based Application. McGraw-Hill Osborne Media.
9. Gregory, P., Lassenius, C., Wang, X., Kruchten, Ph. (2021). Agile Processes in Software Engineering and Extreme Programming. *Springer*, 221 p.
10. Freeman, E., Robson, E. (2020). Head First Design Patterns: Building Extensible and Maintainable Object-Oriented Software 2nd Edition. O'Reilly, 611 p.
11. Peppard, J., Ward J. (2016). The Strategic Management of Information Systems: Building a Digital Strategy, 4th Edition. Wiley, 504 p.
12. Baltzan, P. Business Driven Information Systems 5th Edition. McGraw-Hill Education, 512 p.
13. Ramonyai, J. Software Engineering: Skill Development, Architecture, Design Patterns, Testing, Product Management Concepts. Project Lifecycle, Programming, Quality

Recommended

15. Мартін, Р. С. (2019). Чистий код. 368 с.
16. The modern approach to building corporate information systems (ERP/CRM). [Electronic resource]. Access mode: https://www.purelogics.net/blog/the-modern-approach-to-building-corporate-information-systems-erpcrm/
17. Microsoft Project. The Complete Guide for Project Managers. [Electronic resource]. Access mode: https://www.udemy.com/course/microsoft-project-the-complete-project-lifecycle/
18. Microsoft Project Full Tutorial For Beginners. [Electronic resource]. Access mode: https://www.youtube.com/watch?v=iUqbhkJWt_4
19. Основи тестування програмного забезпечення. [Електронний ресурс]. Ресурс доступу: https://courses.prometheus.org.ua/courses/course-v1:LITS+115+2017_T4/about

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.