Development of Corporate Information Systems

Specialty 121 – Software Engineering 122 – Computer Science	**Institute** Institute of Computer Science and Information Technology
Educational program Software Engineering Computer Science and Intelligent Systems	**Department** Software Engineering and Management Intelligent Technologies (321)
Level of education Bachelor's level	**Course type** Special (professional), Elective
Semester 3-4	**Language of instruction** English, Ukrainian

Lecturers and course developers

Volodymyr Sokol

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PhD, Candidate of Engineering Sciences, Associate Professor of Department of Software Engineering and Management Intelligent Technology of NTU "KhPI". Has more than 10 years of experience in IT companies.

Number of scientific and educational publications more than 25 research papers and textbooks (Google Scholar: https://scholar.google.com.ua/citations?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).
More about the lecturer on the department's website

General information

Summary

The course is aimed at expanding students' knowledge and skills in the development of complex information systems for business.
You will learn how to design and build large-scale information systems using modern programming languages and tools, and how to take into account the needs of the organization. During the course, you will learn how to collect requirements, analyze and design a system, and acquire skills in testing, deploying, and supporting corporate information systems. With these skills, you will be able to make a significant contribution to business development and expand your opportunities in the employment market.

Course objectives and goals

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.

Format of classes

Lectures, laboratory works, control works, self-study. The course ends with a final exam.

Competencies

121 - Software Engineering
K01. Ability to abstract thinking, analysis and synthesis.
K02. Ability to apply knowledge in practical situations.
K05. Ability to learn and master modern knowledge.
K06. Ability to search, process and analyze information from various sources.
K07. Ability to work in a team.
K13. Ability to identify, classify and formulate software requirements.
K14. Ability to participate in software design, including modelling (formal description) of its structure, behavior and functioning processes.
K15. Ability to develop architectures, modules and components of software systems.
K16. Ability to formulate and ensure software quality requirements in accordance with customer requirements, specifications and standard.
K17. Ability to adhere to specifications, standards, rules and recommendations in the professional field in the implementation of life cycle processes.
K19. Knowledge of information data models, the ability to create software for data storage, retrieval and processing.
K24. 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 - Computer Science and Intelligent Systems
GC1. Ability to abstract thinking, analysis and synthesis.
GC2. Ability to apply knowledge in practical situations.
GC3. Knowledge and understanding of the subject area and understanding of professional activity.
GC6. Ability to learn and master modern knowledge.
GC9. Ability to work in team.
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.
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.

Learning outcomes

121 - Software Engineering
PLO03. Know the basic processes, phases and iterations of the software life cycle.
PLO04. Know and apply professional standards and other regulatory documents in the field of software engineering.
PLO08. Be able to develop a human-machine interface.
PLO09. Know and be able to use methods and tools for collecting, formulating and analyzing software requirements.
PLO10. Conduct a pre-project survey of the subject area, systematic analysis of the design object.
122 - Computer Science and Intelligent Systems
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.
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.

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Student workload

The total volume of the course is 240 hours (8 ECTS credits): lectures - 48 hours, laboratory classes - 64 hours, self-study - 128 hours.

Course prerequisites

Students must complete the required general and professional courses in 1-2 semesters of study in full.

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

Teaching and learning methods:
interactive lectures with presentations, discussions, laboratory classes, teamwork, case method, student feedback, problem-based learning.
Forms of assessment:
written individual assignments for laboratory work (CAS), assessment of knowledge in laboratory classes (CAS), express surveys (CAS), online tests (CAS), final/semester control in the form of a semester exam, according to the schedule of the educational process (FAS).

Program of the course

Topics of the lectures
Semester 1

Topic 1. Basic concepts of corporate information systems
Topic 2. Organization principles of corporate information systems
Topic 3. Features of corporate information systems architecture
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
Topic 2. Migration in corporate information systems
Topic 3. Quality assurance of corporate information systems
Topic 4. Support and maintenance of corporate information system

Topics of the workshops

Workshops are not provided within the discipline.

Topics of the laboratory classes
Semester 1

Topic 1. Subject area analysis and formation of requirements to the corporate information system
Topic 2. Design and development of corporate information system modules
Topic 3. Development of a prototype user interface
Semester 2

Topic 1. Development of a database model in accordance with the architecture of the corporate information system
Topic 2. Development of tests for the analysis of work of the corporate information system
Topic 3. Development of a reference system of a corporate information system

Self-study

Individual assignments are not provided in the curriculum.
Students are recommended with additional materials (videos, articles) for self-study and processing.
Semester 1
Imperative programming. Procedural programming imperative programming languages. Declarative programming. Functional programming. Logic programming.

Object-oriented programming. Event-driven programming. Parallel computing. Component-based programming.
Agile manifesto. Principles of agile software development. Agile methods.
Strategic management in corporate information systems.
Semester 2
Test cases and test design techniques
Modern standards of project management. Use of three-dimensional modeling systems. Software. MS Project.

Course materials and recommended reading

Key literature

1. Tatarchuk, M. I. (2014). Corporate information systems: a textbook. Kyiv: KNEU, 329 p.
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 Assurance, Security Systems, Service & Practice / J. Ramonyai. – 2021. – 545 p.
14. Munos P. G. The 5 Secrets of Good Software Testing / P. G. Munos, A. Redwood. - PG Publishing, 2021. – 21 p.

Additional literature

15. Martin, R. S. (2019). Clean code. 368 p.
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. Fundamentals of software testing. [Electronic resource]. Access mode: https://courses.prometheus.org.ua/courses/course-v1:LITS+115+2017_T4/about

Assessment and grading

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

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).

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	08.06.2023	Head of the department Ihor HAMAIUN
	08.06.2023	Guarantors of the educational programs Andrii KOPP Uliya LITVINOVA

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