Syllabus
Course Program

Databases for 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
5

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 a logical continuation of the Corporate Information Systems Development discipline and will help students master the basics of database design and management, taking into account the characteristics and scope of modern organizations.
During the course, you will deepen your knowledge of database modeling and optimization, which are necessary for effective work with corporate information systems.

Course objectives and goals

Formation of students' in-depth knowledge of the theory and skills of practical database development to solve problems of data storage and processing in the work of large enterprises, corporations and other business structures of any industry and form 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.
K19. Knowledge of information data models, the ability to create software for data storage, retrieval and processing.
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.
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
PLO10. Conduct a pre-project survey of the subject area, systematic analysis of the design object.
PLO18. Know and be able to apply information technology processing, storage and transmission of data.
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.

Student workload

The total volume of the course is 120 hours (4 ECTS credits): lectures - 32 hours, laboratory classes - 16 hours, self-study - 72 hours.

Course prerequisites

Development of corporate information systems

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

Topic 1. Basic concepts of databases for corporate information systems

Topic 2. Roles related to the design, development, use of databases in corporate information systems
Topic 3. Database management systems architectures
Topic 4. Databases Schemas in corporate information systems
Topic 5. Database languages
Topic 6. Data models
Topic 7. Fundamentals of data modeling in corporate information systems
Topic 8. Use of SQL language in corporate information systems
Topic 9. Transaction support in corporate information systems

Topics of the workshops

Workshops are not provided within the discipline.

Topics of the laboratory classes

Topic 1. Subject area analysis and development of a system of business rules
Topic 2. Development of a database model in IDEF1X notation
Topic 3. Implementation of the developed data model in the DBMS of the student's choice

Self-study

Individual assignments are not provided in the curriculum.
Students are recommended with additional materials (videos, articles) for self-study and processing.
- DBMS environment components
- Advantages of using a three-level architecture
- Relational algebra operators
- The role of transactions in data storage

Course materials and recommended reading

Key literature

1. Connolly, T., Begg C. (2014). Database Systems: A Practical Approach to Design, Implementation, and Management. Pearson. 6th edition, 1440 p.
2. Elmasri, R., Navathe Sh. B. (2016). Fundamentals of Database Systems. Pearson, 1273 p.
3. Kleppmann, M. (2017). Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable and Maintainable Systems. O'Reilly Media, 616 p.
4. Blokdyk, G. (2021). Database Management Systems A Clear and Concise Reference Paperback. 5STARCooks, 316 p.
5. Powell, G. (2019). Database Modeling Step by Step. Auerbach Publications, 268 p.
6. Mullin, S. (2021). Coding Activities for Building Databases with SQL (Code Creator). Rosen Publishing Group, 64 p.
7. Dietrich, S. W. (2021). Understanding Databases: Concepts and Practice, 1st Edition. Wiley, 320 p.

Additional literature

8. Hameurlain, A., Tjoa, A. M., Amann, B. Goasdoué, F. (2021). Transactions on Large-Scale Data- and Knowledge-Centered Systems XLIX: Special Issue on Data Management. Principles. Technologies and Applications (Lecture Notes in Computer Science, 12920). Springer, 140 p.
9. Wallis, I. (2021). Data Strategy: From definition to execution. BCS. The Chartered Institute for IT, 316 p.
10. SQL Tutorial [Electronic resource]. Access mode : https://www.w3schools.com/sql/

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