DATABASES. COURSE WORK
Syllabus

Реквізити навчальної дисципліни

Cycle of Higher Education	*First cycle of higher education (Bachelor's degree)*
Field of Study	*12 Information Technologies*
Specialty	*121 Software engineering*
Education Program	*Software Engineering of Multimedia and Information Retrieval Systems*
Type of Course	*Normative*
Mode of Studies	*full-time*
Year of studies, semester	*2 year, 3 semester*
ECTS workload	*30 hours for self-study.*
Testing and assessment	*Credit*
Course Schedule	*Not provided*
Language of Instruction	*English*
Course Instructors	*Commission for acceptance of coursework defenses:* *Ph.D., Associate professor, Inna Saiapina, saiapina@pzks.fpm.kpi.ua* *Ph.D., Senior lecturer, Oksana Shkurat, shkurat@pzks.fpm.kpi.ua*
Access to the course	Google classroom. To be provided to registered students.

Outline of the Course

1. **Course description, goals, objectives, and learning outcomes**

The purpose of studying "Databases. Course work" is the formation of students' ability to independently design, programmatically implement and administer databases for the optimization of information and search systems and applications built on their basis, systematization of acquired knowledge and consolidation of practical skills:

- *conceptual, logical and physical design and development of relational databases of information systems;*
- *analysis and ability to choose the optimal database management system to solve the tasks;*
- *ensuring the selection of the necessary information in the required form thanks to mastering the SQL language;*
- *analysis and improvement of database performance due to optimization of SQL queries and use of indexes;*
- *ensuring the preservation of the integrity of the database due to the high-quality application of restrictions, triggers, stored procedures and checking the execution of transactions.*

The subject of the "Databases. Course work" are methods, models, hardware and software used for designing, developing and managing databases.

*The study of the "Databases. Course work" contributes to the formation students' **general (GK)** and **professional competencies (PC)**, which are necessary for solving practical tasks of professional activities related to the development, optimization and operation of databases:*

GC02 Ability to apply knowledge in practical situations.

PC01 Ability to identify, classify and formulate software requirements.

PC02 Ability to participate in software design, including its structure, behavior and functioning processes modeling (formal description).

PC03 Ability to develop software systems architectures, modules and components.

PC04 *Ability to formulate and ensure software quality requirements in accordance with customer requirements, specifications and standards.*

PC07 Knowledge of information data models, the ability to create software for data storage, retrieval, and processing.

PC08 *Ability to apply fundamental and interdisciplinary knowledge to successfully solve software engineering problems.*

PC10 *Ability to accumulate, process and systematize professional knowledge on software creation and maintenance and recognition of the importance of lifelong learning.*

PC12 *Ability to carry out the system integration process, apply change management standards and procedures to maintain software integrity, overall functionality and reliability.*

PC13 Ability to reasonably select and master software development and maintenance tools.

PC14 Ability to algorithmic and logical thinking.

PC15 Ability to apply fundamental and interdisciplinary knowledge to build advanced search algorithms.

PC17 Ability to develop software for information retrieval systems.

PC19 Ability to develop software for multimedia and multimedia systems.

The study of the "Databases. Course work" contributes to the formation of students in the following **program learning outcomes (PLO)** *according to the educational program:*

*PLO12 **To apply effective approaches to software design in practice.***

PLO13 To know and apply algorithm development methods, software, data and knowledge structures design.

PLO14 To apply in practice instrumental software tools for domain analysis, design, testing, visualization, measurement and documentation of software.

PLO18 Know and be able to apply information technology of processing, storage, and transmission of data.

PLO23 To be able to document and present the software development results.

PLO38 To be able to apply programming technologies for multimedia and information retrieval systems software development.

PLO44 Know the most common query languages used in the development of information retrieval systems.

1. **Prerequisites and post-requisites of the course (the place of the course in the scheme of studies in accordance with curriculum**

Successful study of "Databases. Course work" is preceded by study of disciplines «Algorithms and Data Structures» of the curriculum for bachelors training in the specialty 121 Software engineering.

The theoretical knowledge and practical skills obtained during the assimilation of the "Databases. Course work" contribute to the assimilation of material from the disciplines «Databases» and ensure the successful completion of the diploma projects in the specialty 121 Software Engineering.

2. **A typical task for a course work**

   Development of a database for the information system of a given subject area.
   Basic database requirements:
   1. The presence of at least 4-5 entities at the stage of conceptual modeling.
   2. The presence of various types of connections between entities.
   3. Availability of restrictions, triggers, stored procedures to ensure the integrity of the database.

The student may, if he wishes, propose his own variant of the individual task for the development of the database, but it should meet the requirements. The student has to agree it with the teacher first.

3. **Defense organization and performance of course work**

• *Course work is performed by each student individually according to the variant agreed with the teacher.*

• *The course work consists of a software system and its documentation.*

• The course work is defended in the form of a presentation with a demonstration of the developed software product.

4. Course work schedule

•Specification and coordination of the individual task - by October 7.
• Development of an infologic and data logic model - by October 21.
• Development of the physical model of the database - by November 18.
• Implementation of the database in the selected database management system - by December 2.
• Defense of the course work - until December 30.

5. Coursebooks and teaching resources

Main literature:

1. *Educational materials for the "Databases. Course work". Use to master practical skills in the discipline. The materials are in Google classroom. Access is granted to registered students.*

To complete a course work, the student needs the following resources: Open source PostgreSQL package, which is distributed under a free license.

Policy and Assessment

6. Course policy

- *Adherence to the policy of academic integrity.*
- *The rules for assigning bonus and penalty points are as follows.*

Bonus points are awarded for:
- a creative approach in course work. Maximum number of points: 9 points. Penalty points are calculated for:
- plagiarism The program code does not correspond to the task variant, the identity of the program code among different works (number of points: 10 points).

7. Monitoring and grading policy

The maximum number of points for the course work: 100 points.
Points are awarded for:
- software product quality, 0-25 points;
- database modeling quality, 0-25 points;
- correct application of sequences, restrictions, representations, triggers, stored procedures, 0-25 points;
- quality and completeness of documentation, 0-10 points
- quality and completeness of the presentation and demonstration of the software product, 0-10 points
- timeliness of presentation of work for defense, 0-5 points.

Criteria for evaluating the quality of a software product:
24-25 points – the development is done qualitatively, in full;
20-23 points – the development is done qualitatively, in full, but has minor flaws;
6-19 points – the development is carried out to a sufficient extent, but contains shortcomings;
0-5 points - robotic development and not completed in full or contains significant shortcomings.

Criteria for evaluating the quality of database modeling:
24-25 points – the modeling of the database is performed qualitatively, there is a creative approach;
20-23 points – the database modeling is performed qualitatively, all requirements are met;
6-19 points – database modeling is performed qualitatively, there are minor remarks;
0-5 points – the database modeling is incomplete or contains significant deficiencies.

Criteria for evaluating the correctness of the application of sequences, restrictions, representations, triggers, stored procedures:

24-25 points – sequences, constraints, representations, triggers, stored procedures are selected and applied correctly;
20-23 points – sequences, constraints, representations, triggers, stored procedures are selected and applied with minor flaws;
6-19 points – sequences, constraints, representations, triggers, stored procedures are selected and applied with errors;
0-5 points – sequences, restrictions, representations, triggers, stored procedures are not applied or there are significant deficiencies.

Criteria for evaluating the quality and completeness of documentation:
10 points – the documentation is done at a high level, there are no remarks;
6-9 points – the documentation is done qualitatively, but has shortcomings;
1-5 points – the documentation is completed at an acceptable level, but has significant shortcomings;
0 points - the documentation is done poorly.

Criteria for evaluating the quality and completeness of the presentation and demonstration of the software product:
10 points – the presentation and demonstration were performed at a high level, there are no remarks;
6-9 points – the presentation and demonstration are done well, but there are shortcomings;
1-5 points – the presentation and demonstration are performed at an acceptable level, but there are significant shortcomings;
0 points – the presentation and demonstration were performed poorly.

Criteria for evaluating the timeliness of work submission for defense:
5 points – the work is submitted for defense no later than the specified deadline;
0 points – the work is submitted for defense later than the specified deadline.

The maximum number of points for completing and defending a course work:
25 points + 25 points + 25 points + 10 points + 10 points + 5 points = 100 points.

Semester control: credit

Table of correspondence of rating points to grades on the university scale:

Points	Grade
95-100	Excellent
85-94	Very good
75-84	Good
64-74	Satisfactory
60-64	Fair
Less than 60	Unsatisfactory
Course requirements are not met	Not Graded

Syllabus of the course

Is designed by Inna Saiapina, Ph.D., Assoc. Prof.

Adopted by Computer Systems Software Department (protocol № 12 from 26.04.23)

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