СӘТБАЕВ
УНИВЕРСИТЕТІ

SATBAYEV
UNIVERSITY

Institute of Automation and Information Technologies
(full name of the institute)
Department of Software Engineering
(full name of the department)

APPROVE

Uskenbayeva R.K.
(signature, MP)
(full name of the director of the institute)

_____ 202__

SYLLABUS

CSE6792 Databases
(code and name of discipline)

6B06102 Computer Science
(code, name of the educational program)

5 (1/1/1) credits
(amount)

Semester: 3 (autumn), 2022-2023 academic year
(indicate the semester number for the course, autumn/spring)

Almaty 2022

1 Information about the teacher
1.1 lecturer:
Kalpeyeva Zhuldyz Beishenalievna, associate professor
(name of teacher, position)

Form of education - <u>full-time</u> / distance

office: 302 KCC   Office hours: Friday 10:00-13:00
(office, building)
tel., WhatsApp +7705 – 174-8584   e-mail: z.kalpeyeva@satbayev.university

1.2 teacher conducting practical / laboratory work
Kalpeyeva Zhuldyz Beishenalievna, associate professor
(name of teacher, position)

office: 302 KCC   Office hours: Friday 10:00-13:00
(office, building)
tel., WhatsApp +7705 – 174-8584   e-mail:
                                        z.kalpeyeva@satbayev.university

2 Purpose and objective of the course
Purpose:
The purpose of the course is to give students knowledge and skills in database design, working with the structured query language, and skills in working with database management systems.

Tasks:
- study of the basic concepts of databases and terminology;
- the ability to determine the needs for information within the organization and formulate user and organizational requirements for the database;
- construction of a conceptual model that satisfies these needs and requirements;
- study of the normalization process;
- implementation of an appropriate logical model in a relational database management system (for example, PostgreSQL, MySQL, etc.);
- learning the basics of SQL to create various queries to meet the information needs of users.

3 Description of the course:
The course is intended for students of the educational program "6B06102 Computer Science".
(code, name of the educational program)

The course explores database design from the beginning to physical

implementation with a relational database management system. The objectives of the course include building an entity-relationship model and normalizing the database. Relational algebra, SQL (Structured Query Language) are introduced.

4. Learning outcomes
After completing the course, the student must:
Be able to:

– describe the process of database design, identify and describe the stages of database design and related issues, analyze and estimate the normalization and results of database design;

– demonstrate the database design starting from the analysis and the conceptual stage with ER diagram to the physical implementation using DBMS;

– demonstrate skills with Structured Query Language (DDL, DML);

– use DBMS (PostgreSQL) as an environment to implement problems using SQL language;

– discuss issues related to the Database Management Systems and database design.

Know:

– theoretical and conceptual foundations of database design;

– data organization models;

– basic principles of constructing a conceptual, logical and physical data model;

– methods of organizing data integrity.

5 Calendar-thematic plan

A week	Lecture topic	Topic of practical work	Topic of laboratory work	Literature	Task	Deadline
1	Introduction to databases. DBMS	Domain Analysis	Domain analysis. Installing and configuring DBMS	basic[1-2] additional [3-4]	Install PostgreSQL DBMS	Week 2
2	Database design. Generalized conceptual model.	Conceptual design	Conceptual design	Basic[1-2] Доп.[3-4]	Build a conceptual data model. ER diagram	Week 3
3	Normalization. Update Anomalies and Functional Dependencies	Normalization	Normalization	Basic[1-2] Additional[3-4]	Update Anomalies and Functional Dependencies	Week 4
4	Normalization. First, Second and Third Normal Forms	Physical design	Physical design	Basic[1-2] Additional[3-4]	Create a database in a DBMS using SQL DDL statements	Week 5
5	SQL. Data Definition Language	SQL DML. INSERT. UPDATE. DELETE	SQL DML. INSERT. UPDATE. DELETE	Basic[1-2] Additional[3-4]	SQL DML. INSERT. UPDATE. DELETE	Week 6

A week	Lecture topic	Topic of practical work	Topic of laboratory work	Literature	Task	Deadline
6	SQL. Data Manipulation Language	Relational algebra.	Relational algebra.	Basic[1-2] Additional[3-4]	Relational Algebra operators	Week 7
7	Relational Algebra	Relational Algebra	Relational Algebra	Basic[1-2] Additional[3-4]	Relational Algebra operators	Week 8
8	Midterm					Week 8
9	DML. Queries	Relational Algebra	Relational Algebra	Basic[1-2] Additional[3-4]	Relational Algebra operators	Week 10
10	DML. Queries	Запросы. SELECT	Запросы. SELECT	Basic[1-2] Additional[3-4]	SQL DML statements	Week 11
11	Nested queries	Queries. GROUP B. HAVING	Queries. GROUP B. HAVING	Basic[1-2] Additional[3-4]	Complex queries	Week 12
12	CTE. Views	Nested queries	Nested queries	Basic[1-2] Additional[3-4]	Nested queries	Week 13
13	Transactions	CTE. VIEW	CTE. VIEW	Basic[1-2] Additional[3-4]	CTE. VIEW VIEW	Week 14
14	Course Overview. Perspective Database Technologies	Project defense	Project defense	Basic[1-2] Additional[3-4]	Project defense	Week 15
15	Endterm					Week 15
	Final exam					According to schedule

6 Literature

Основная литература	Дополнительная литература
[1] Connolly, Thomas M. Database Systems: APractical Approach to Design, Implementation, and Management / Thomas M. Connolly, Carolyn E. Begg.- United States of America: Pearson Education, 6th Edition, 2014	[3] Garcia-Molina, H. Database system: The Complete Book / Hector Garcia-Molina.- United States of America: Pearson Prentice Hall
[2] Sharma, N. Database Fundamentals: A book for the community by the community / Neeraj Sharma, Liviu Perniu.- Canada	[4] Kuzin A. V. Databases: textbook. allowance for universities / A.V. Kuzin, S.V. Levonisov. - 4th ed., erased. - M. : Akad., 2010. - 320 p. : ill. - (Higher professional education. Informatics and computer technology). - ISBN 978-5-7695-7368-2

*Literature is available in the electronic resources of the library.
** The main literature should not be older than 10 years.
~ Literature is available on the teacher's educational portal.

7 Competence framework

Learning	Competencies

Descriptors	Natural-science and theoretical-ideological	Social-personal and civil	General engineering professional	Intercultural and communicative	Special professional
Knowledge and understanding	+		+		+
Application of knowledge and understanding	+		+		+
Expression of judgments and analysis of actions	+		+		+
Communication and creative skills	+		+		+
Self-learning and digital skills	+		+		+

8 Required work schedule

№ п/п	Types of control	Max score for the week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total max points
1	Активность на лекционных обсуждениях																	
2	Выполнение заданий (СРСП)								*							*		
3	Выполнение практических заданий		*	*	*	*	*	*	*		*	*	*	*	*	*		24
4	Выполнение лабораторных заданий		*	*	*	*	*	*			*	*	*	*	*	*		32
6	1-я промежуточная аттестация									*								2
8	2-я финальная аттестация															*		2
9	Итоговый экзамен*																	40
	Всего в сумме																	100

9 Evaluation rating and possible final evaluation options by criteria

Letter grade	GPA	points	Criteria
A	4	95-100	Shows the highest standards of knowledge beyond the scope of the course being taught
A-	3,67	90-94	Conforms to the highest standards of knowledge
B+	3,33	85-89	Very good and meets high standards of knowledge
B	3	80-84	Good and meets most high standards of knowledge
B-	2,67	75-79	More than sufficient knowledge approaching high standards
C+	2,33	70-74	Sufficient knowledge corresponding to general standards
C	2	65-69	Satisfies and complies with most common knowledge standards
C-	1,67	60-64	Satisfies, but according to some knowledge does not meet the standards
D+	1,33	55-59	Satisfies minimally, but does not meet the standards for a wide range of knowledge
D	1	50-54	Minimum Satisfactory Passing Score with Questionable Compliance
FX	0,5	25-49	Interim Grade: Failing Low Scores, Retake Exam Required
F	0	0-49	Did not try to master the discipline. It is also set when a student tries to get a grade on an exam by deceit.
I	0	0	Interim Grade: Student who completed most of the course successfully, did not complete the final control activities due to valid circumstances

W	0	0	The student voluntarily withdrew from the discipline and did not master it until the 6th academic week
AW	0	0	the student was removed from discipline by the teacher for systematic violations of the academic order and rules

10 Evaluation criteria

Each work, except for tests, is evaluated according to 4 criteria:

- accuracy and accuracy (A) - 30% (how accurately and accurately the work is calculated);

- creativity and creativity (T) - 30% (how and in what way the work is presented);

- completeness and maturity (Z) - 40% (how deeply, logically and structurally the work is solved);

– originality (O) – a special coefficient of 1.0 is used; 0.5 or 0.

Criteria	Excellent (0.9-1.0)	Good (0.7-0.9)	Satisfactory (0.4-0.7)	Unsatisfactory (0-0.4)
Accuracy and Precision				
Creativity and creativity				
Completeness and maturity				
Originality				

The overall score will be calculated using the formula:

Grade $= (A + T + 3) \times O$

Maximum assessment of knowledge by types of tasks

Tests and activityь	
Student Independent Work (SIW)	
Completion of practical tasks	28
Completion of laboratory tasks	26
Midterm	3
Course project	
Endterm	3
Final exam	40
Total	100

11 Late submission policy

The student must come prepared for lectures and practical (laboratory) classes. Timely protection and full performance of all types of work (practical and independent) are required. The student should not be late and miss classes, be punctual and obligatory. There is a 10% reduction in the maximum score for late submissions. If you are forced to miss an intermediate certification for good reasons, you must notify the teacher in advance so that you can pass the midterm control in advance. Missing an exam for an unexcused reason deprives you of the right to take it. If you miss an exam for a good reason, a special permit is issued and the date, time and place of the exam are set.

12 Academic and Ethics Policy

Be tolerant and respect other people's opinions. Formulate objections in the correct

form. Plagiarism and other forms of dishonest work are unacceptable. Prompting and cheating during exams, passing an exam for another student are not allowed. A student found to have falsified any course information will receive a final grade of "F".

Activity at lectures and practical classes is obligatory and is one of the components of your final score / grade. Many theoretical questions that reinforce the lecture material will be presented only at the lectures. Therefore, missing a class can affect your academic performance and final grade. However, class attendance does not in itself mean an increase in points. Your constant active participation in the classroom is required. A mandatory requirement of the course is preparation for each lesson. It is necessary to view the indicated sections of the textbook and additional material not only in preparation for practical exercises, but also before attending the corresponding lecture. Such preparation will facilitate your perception of new material and will contribute to your active acquisition of knowledge within the walls of the university.

Help: For advice on the implementation of independent work, their delivery and protection, as well as for additional information on the material covered and all other questions about the course being taught, please contact the teacher during his office hours or via electronic means of communication during working hours.

When learning

Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for independent study of the lesson:

- mandatory reading of the presented materials before class;
- submission of assignments on time;
- 20% non-participation in classrooms (for a good reason with supporting documents) - grade "F (Fail)";
- plagiarism and cheating when completing a task are not allowed;
- Mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.

As part of the training in the discipline, any corruption in any form is unacceptable. The organizer of such actions (teacher, students or third parties on their behalf) bear full responsibility for violation of the laws of the Republic of Kazakhstan.

Reviewed and approved at a meeting of the Department of Software Engineering Protocol No. 1 of 08/26/2022.
(name of department)

Compiled by: associate professor_____ **Kalpeyeva Zh.B.**
(signature)

_____ **Moldagulova A.N.**
(signature, MP)
(full name of the head of the department)