Databases

Course Syllabus

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Riga Nordic University
Latvia

2026

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Contact Information

Instructor: Asoc.Prof. Yuriy Shamshin

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Course duration, hours: 4h x 15 = 60h, 4 points

Course website https://dbs.academy.lv/ contains:

- lecture slides (LS),
- lesson videos (LV),
- trainings and practice work assignments (PW),
- lab work assignments (LW),
- home works assignments (HW),
- online tools and software,
- books (BK),
- links to the frequently websites,
- tests and quizzes (QZ).

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Course Objectives

The course covers complex issues related to database design, data modelling and normalization, query optimization, functional dependencies, data integrity and data security.

At the conclusion of this course, the successful (passing) student will be able to:

1. Master knowledge to understand concepts of database design and management
2. Demonstrate understanding of effectiveness and faithfulness of data models.
3. Complete the design and development of the assigned projects in Database design and management.

This course helps achieve the following objectives:

1. Apply basic principles, knowledge, and skills in developing and managing computer science projects.
2. Implement projects that have value for industry and commerce.

Prerequisites and Required Skills

The course does not assume prior knowledge of databases. However, the course will move relatively fast.

This course will help everyone to gain or improve theory of DBMS (database management system) and skills in building SQL DML (Data Manipulation Language) and DDL (Data Definition Language), DCL (Data Control Language), TCL (Transaction Control Language) statements.

During the training, you will be required to design a DBMS and independently write SQL queries to retrieve or modify specific data required to complete homework assignments.

Expected Skills:
This course is not suitable for students without basic computer and mathematical skills.

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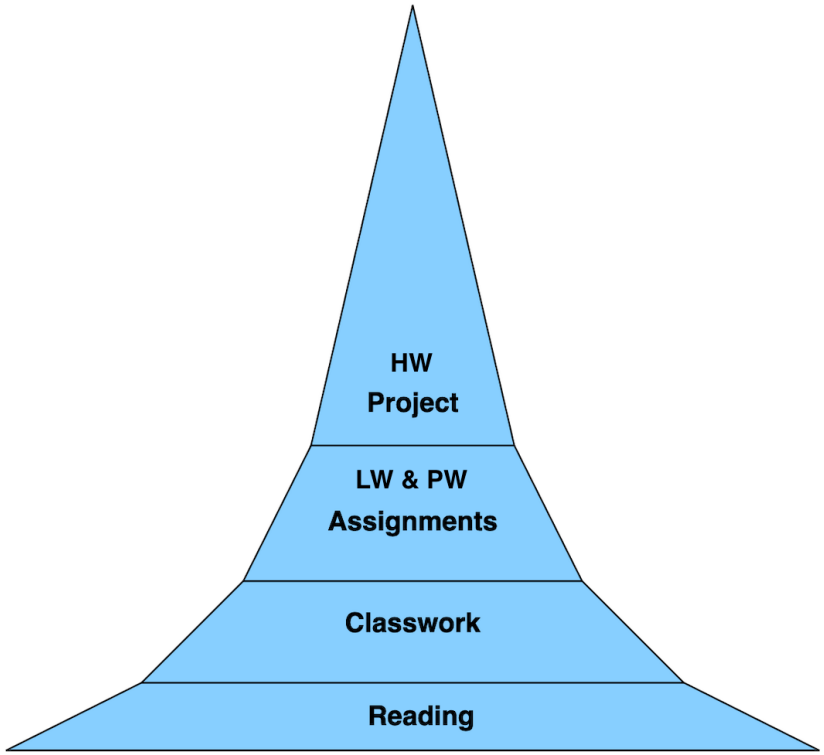
Teachings Philosophy

- Emphasis on building stuff that works: Practical skills.
- Lateness policy is designed to encourage success rather than timeliness, but we have to find a balance.
- Grading is mostly on functionality, though there is a role for clarity, modularity, efficiency and style.
- Readings are important to make our class time more effective and to gain confidence about learning from tutorials, references and so forth.
- Classwork gives you a chance to make mistakes with support
- LW & PW Assignments integrate several skills and go beyond Classwork
- The biggest, most rewarding part of your learning is in the HW project.
- The project allows you to go deep

Reading supports Classwork which supports Assignments which supports the Project →



Honor Code

Unless otherwise instructed, feel free to discuss problem sets with other students and exchange ideas about how to solve them. However, there is a thin line between collaboration and plagiarizing the work of others. Therefore, I require that you must compose your own solution to each assignment. In particular, while you may discuss problems with your classmates, you must always write up your own solutions from scratch.

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Reading Resources

1. MDM – Modern Database Management (print book).
Jeffrey A. Hoffer, V. Ramesh, Heikki Topi.—13th ed. 2020. 586 p. [PDF]

2. DBDT – Data Base Design Tutorial (online-2026).

a) Lucid.co. What is a Database Schema (https://lucid.co/diagram/database/database-design-and-structure)
b) Lucid.co. What is a Database Model (https://lucid.co/diagram/database/database-models)
c) Lucid.co. Database structure and design tutorial (https://lucid.co/diagram/database/database-design-and-structure)
d) Lucid.co. Create an Entity Relationship Diagram in Lucidchart (https://help.lucid.co/hc/en-us/articles/16471565238292-Create-an-Entity-Relationship-Diagram-in-Lucidchart)

3. SDDT - SQLBolt. Learn SQL with simple, interactive exercises (online-2026). (https://sqlbolt.com/)

4. SDMT - SQL Tutorial (online-2026). (http://www.sqltutorial.org/)
- SQL Syntax.
- SQL Sample Database.
- SQL Tutorial.
- SQL Cheat Sheet.
- SQL in Action

Optional Reading Resources

5. SQL DDL Tutorial. (http://www.sql-tutorial.ru/en/book_sql_ddl.html)

6. SQL DML Tutorial. (http://www.sql-ex.ru/help/?Lang=1)

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Road Map

Lectures, Labs, Practices, Home Works Schedule and Reading Topics

Weeks	Chapters	Slides	Topics	Reading/View	Labs, Practices, Homeworks (*Optional)
1	I. DATABASES OVERVIEW	LS-01 LS-02a,b	Database Management System (DBMS) Introduction. Databases History. Traditional and NoSQL Database Models.	1. MDM	
2	II. DATA MODELING & DATABASE DESIGN	LS-03 LS-04	Database Development Life Cycle. Subject Area Analysis. Conceptual Database Design. Entity Relationship Diagram.	2.DBDT.a	LW-01EN. Conceptual DB Design. Creation ERD with Online CASE Tools.
3		LS-05	Logical Database Design. Relational Data Model (RDM). Relation Algebra.	2.DBDT.b	HW-01EN. Conceptual DB Design. Subject Area Analyze, ERD.
4		LS-05a	Relation Algebra and Calculus.	2.DBDT.c	
5		LS-06 LS-06a	Mapping ER Diagrams to Relation Data Model. Choosing Data Types in MySQL.		LW-02EN. Logical DB Design. Creation RDM with Online CASE Tools.
6		LS-07 LS-07a	RDM Normalization. Data Anomalies. Functional Dependency. Normal Forms. Data normalization (Continue).	LV-07	HW-02EN. Logical DB Design. Data Dictionary, RDM, Normalization.
7	III. SQL DDL BASICS	LS-08	SQL Overview. SQL DDL. Data Types.	3. SDDT/ LV-08.1-LV-08.9	LW-03EN. Physical DB Design. Creation MySQL Database on a XAMPP Stack or DBMS Hosting.
8		LS-09	SQL DDL. Database Integrity Constraints.	LV-09.1,LV-09.2	HW-03EN. Physical DB Design. SQL DDL/DML: Create, Insert Design.
9	IV. SQL DML BASICS	LS-10	SQL DML. INSERT, UPDATE, DELETE, MERGE, REPLACE, UPSERT, SELECT Statements.	4. SDMT/ LV-10.1-LV-10.6	LW-04EN. SQL: Data Modification Exercises (Insert, Update, Delete, Merge).
10		LS-11	SQL SELECT Constructions 1: Sorting, Filtering.	3. SDDT/ LV-11.1-LV-11.3	*PW-01EN. SQL: Interactive Tutorial (Select). LW-05EN. SQL: Data Retrieving Exercises (Select).
11	V. SQL DML EXTENDED	LS-12	SQL SELECT Constructions 2: Grouping, Aggregate Functions.	LV-12.1-LV-12.2	*PW-02EN. SQL: Training Quizzes.
12		LS-13	SQL SELECT Constructions 3: Joining Multiple Tables, Subqueries.	LV-13.1-LV-13.6	HW-04EN. SQL DML: Select Design.
13		LS-14	SQL Views.	LV-14.1	*PW-03EN. Query's Training on SQL Tutorial Site.
14		LS-15	SQL TCL. Transactions.	4. SDMT	*HW-05EN. SQL DDL/DML: View, Update, Delete Design.
15	VI. DBMS EFFICIENCY	LS 16	DBMS Efficiency. Storage and Indexing.		*HW-06EN. Web Application Design for Databases.
16	VII. FINAL SUBJECT GRADE	All below	Simple SUM of all Your Reports Grades.	All below Part	All below assignments Reports

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Course Reports Information

1. «Lab Works», look https://dbs.academy.lv/labwork.php - m1.

Complete the Lab Works and send Reports over ISMA Moodle System.
- LW-01EN. DB Conceptual Design. Creation ER Diagrams with Online CASE Tools.
- LW-02EN. DB Logical Design. Creation Relation Data Model with Online CASE Tools.
- LW-03EN. DB Physical Design. Creation mySQL Database on free Database & Web Hosting servers.
- LW-04EN. SQL: Data Modification Exercises (Insert, Update, Delete, Merge). Complete the first 11 of 57 exercises on SQL-ex.ru Site:
  a) Registration (https://www.sql-ex.ru/register.php?Lang=1);
  b) Exercises (https://www.sql-ex.ru/dmlexercises.php?Lang=1).
- LW-05EN. SQL: Data Retrieving Exercises (Select). Complete ANY 21 of 190 Exercises on SQL-ex.ru Site:
  a) Registration (https://www.sql-ex.ru/register.php?Lang=1);
  b) Exercises (https://www.sql-ex.ru/learn_exercises.php?Lang=1).

2. «Practice Works», look https://dbs.academy.lv/labwork.php - m2.

Complete the Practice Works without any report.
- *PW-01EN. SQL: Interactive Tutorial (Select). Complete the 18 Lessons and 18 Exercises on SQL Bolt Site (https://sqlbolt.com/).
- *PW-02EN. SQL: Training Quizzes. Complete 8 Tutorials and 6 Quizzes specified in assignment on SQL Zoo Site (https://sqlzoo.net/).
- *PW-03EN. SQL: Free Query's Training on SQL Tutorial Site (https://www.sqltutorial.org/seeit/).

3. «Home Works», look https://dbs.academy.lv/labwork.php - m3.

Complete the Home Works and send single Summary Report HW-01-04 over ISMA Moodle System.
- HW-01EN. Conceptual Database Design. Subject Area Analyze, ERD.
- HW-02EN. Logical Database Design. Data Dictionary, RDM, Normalization.
- HW-03EN. Physical Database Design. SQL DDL/DML: Create, Insert Design.
- HW-04EN. SQL DML: Select Design.
- Optional. HW-05EN. SQL DDL/DML: View, Update, Delete Design.
- Optional. HW-06EN. Web Application Design for Databases.

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Course Grading Policy

Course activity:		Cost, %
Interactive participation in Classroom		10%
Lab Works Reports		50%
LW1	10%,	
LW2	10%,	
LW3	10%,	
LW4	10%,	
LW5	10%.	
Practice Works Reports		0%
*PW1	0%,	
*PW2	0%,	
*PW3	0%.	
Home Works Reports		40%
HW1	10%,	
HW2	10%,	
HW3	10%,	
HW4	10%,	
*HW5	0%,	
*HW6	0%.	
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Final Grade SUM		100%

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* Optional PW, HW

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