

### DERS TANITIM BİLGİLERİ (İNGİLİZCE)

## Course Information

[illegible]

	<p>degree of SQL, albeit not in depth. However, other skills in analysis and assignments that merge technical and non-technical tasks take time in the course.</p> <p>This course uses the DB analyst approach.</p> <p>Another important recent topic is the use of AI in database related work. In early cases this has been limited to asking an AI LLM to create SQL statements, or perform simple DB design tasks.</p> <p>However, over the last years, an increasing number of tools have appeared and their use has been wide-spread. From the DB analyst point of view, it is now part of modern tool set. So this course will cover some of the better performing tools. Using AI tools also has some drawbacks, and with each tool those drawbacks will also be covered.</p> <p>Therefore this course is a modern AI augmented approach to modern databases from a DB Analyst point of view.</p> <ul style="list-style-type: none"> <li>• The course employs fail-forward framing: AI errors are part of the learning. Students shouldn't feel punished for relying on AI — the grade will reward their fixes and reflections.</li> <li>• Questions on AI augmentation. – Exams will also include questions on AI use.</li> </ul>
References	<p><b>Main Textbook:</b></p> <ul style="list-style-type: none"> <li>• Introduction to Database Systems, 8th Ed. Date, C.J. 2003. Pearson.</li> </ul> <p><b>Reference Textbook:</b></p> <ul style="list-style-type: none"> <li>• Database Design for Mere Mortals: A Hands-On Guide to Relational Database Design, 3<sup>rd</sup> Ed. 2013. Hernandez, M.J. Addison-Wesley.</li> <li>• SQL Antipatterns: Avoiding the Pitfalls of Database Programming (Pragmatic Programmers). 2017. Karwin, B. Pragmatic Programmers.</li> </ul> <p><b>Suggested Supplementary Textbook in Turkish:</b></p> <ul style="list-style-type: none"> <li>• Veri Tabanı Yönetim Sistemleri – 1, Özseven, T. 2017. Ekin.</li> <li>• SQL ve NoSQL: Kavram – Teori – Uygulama, Daşdemir, Y. 2019. Seçkin.</li> </ul>

## Course Schedule

Friday, 12:30 -15:20, RB 113

## Weekly Course outline

Weeks	Topics	Pre-study
Week 1	<p>Course Review</p> <p>Review of popular DBMS alternatives, Use of Cloud for Database as a Service, Use of AI in Databases</p> <p><b>AI Demo:</b> Use of ChatGPT to compare DBMS alternatives</p>	
Week 2	<p>Practical Concepts: Tables, Columns, Row, and Data Types, Understanding CRUD: Simple Database Backed Business Operations</p> <p><b>Demo:</b> SQL Fiddle</p> <p><b>Demo:</b> MySQL Installation on a PC (Linux),</p>	Lecture Notes & Preliminary Work (Includes creating accounts on Github)
Week 3	<p><b>AI Demo:</b> Use of Perplexity AI to assist in using MySQL deployed on Amazon Free Tier virtual machine.</p> <p><b>Project Teams First Meetup</b></p> <ul style="list-style-type: none"> <li>• Discussion of project topics</li> <li>• Timeline</li> <li>• Toolset</li> </ul>	Lecture Notes & Preliminary Work (Includes creating accounts on Amazon Web Services)
Week 4	<p>Relational Database Design and Normalization</p> <p><b>Demo:</b> Use of dbdiagram.io to create diagrams</p> <p><b>AI Demo:</b> Text 2 SQL using SQLAI on HuggingFace Spaces</p>	Lecture Notes & Preliminary Work
Week 5	<p>Relational Database Design and Normalization (cnt'd)</p> <p><b>AI Demo:</b> Using ChatGPT generated schema to create diagrams on dbdiagram.io</p>	Lecture Notes & Preliminary Work
Week 6	<p>How Application Software Communicate with Relational Databases, Examples with Java and Python, SQL Queries Single Table</p> <p><b>AI Demo:</b> Using GitHub Copilot Chat (free for students) for create Python code</p>	Lecture Notes & Preliminary Work <b>Homework Assignment #1 (Database Design)</b>

Week 7	How AI-Generated SQL fails.	Lecture Notes & Preliminary Work <b>Homework Assignment #2 (SQL Queries)</b>
Week 8	<b>Midterm Exam (tentative)</b>	
Week 9	<b>Project Teams Second Meetup</b> <ul style="list-style-type: none"> <li>• Presentation of end user use cases</li> <li>• Presentation and discussion of table structure with diagrams</li> </ul>	Lecture Notes & Preliminary Work <b>Homework Assignment #3 (SQL Queries)</b>
Week 10	Operators and Functions, Joins and Sub-queries <b>AI Demo:</b> DataMagic (HuggingFace demo)	Lecture Notes & Preliminary Work Homework
Week 11	Views and Indexes <b>AI Demo:</b> ExplainMySQL (free online tool)	Lecture Notes
Week 12	Limitations Of Relational Database Use, CAP Theorem, NoSQL, Vector Databases <b>AI Demo:</b> Discussing Redis Key-Value store use cases, Discussing MongoDB Document database use cases	Lecture Notes <b>Homework Assignment #4 (Explaining SQL)</b>
Week 13	Databases in Organizations, Actual DBA Tasks: Backup and Recovery, Methods to Ensure Data Quality	Lecture Notes
Week 14	<b>Project Teams Final Meetup</b> <ul style="list-style-type: none"> <li>• Presentations</li> <li>• Functional Demo</li> </ul>	Project Delivery

## Assessment methods

Course Activities	Number	Percentage %
Attendance (mandatory after add-drop period)	12	10
Weekly Preliminary Work	Up to 8	20
Assignments	4	20
Projects	1	30
Midterm Exam (Written with open ended questions)	1	20
<b>Total</b>	<b>24</b>	<b>100</b>
Percentage of semester activities contributing grade success	24	100
Percentage of final exam contributing grade success		
<b>Total</b>	<b>24</b>	<b>100</b>

**Attendance:** Attendance after add-drop period is mandatory. Students are required to attend at least %70 of classes. Typical excuses such as health reports should be communicated with the instructor.

**Use of Github:** All student work except in-class exams will be submitted through Github. Use of Github is a modern, widely used and well documented way to share code and datasets. It also allows easy tracking of source code, including finding out where it has been copied and pasted from. Therefore ECON majors are expected to be able to use it. **As Github use is mandatory, all work submitted in other ways will be automatically disqualified and graded as zero.**

**Preliminary Homeworks:** Students are required to complete simple preliminary homeworks and submit them through Github. These homeworks will contribute toward a major part of their learning and also to their grade.

**Use of SQL and MariaDB:** Course discussions are based on ANSI standard SQL, but will in many times involve examples using MariaDB which is one of the most popular database management systems in the world. Most if not all homeworks and preliminary work will require use of SQL statements, and some coursework including in-class exams **will test students' experience with actual DBMS systems such as MariaDB.** As MariaDB is free software, students have no license limitations to install it to their own computers.

**Use of "Free-Tier" Cloud Services:** Many cloud service providers such as Amazon or Google provide no-cost limited capacity use of their resources. There are also particular programs aimed at students. This course encourages use of such "free-tier" cloud services in order to deploy DBMS and test SQL statements on a cloud-deployed DBMS.

**Use of Programming Languages:** Course discussions are language-independent. Assignments can be submitted using any typical programming language such as Python, Java or C++. Students are

expected to have a fundamental understanding of the language they submit their homeworks in. Note that SQL will be the required method of database access in this course.

**Use of Third Party Code Examples and Tutorials:** Most, if not all, of class homeworks will require students to use programming libraries. These libraries are in all cases well documented and there are several online examples and tutorials for these libraries. In case a student finds useful code snippets, and simply copies and pastes the code, this is allowed. However, students are **required to give a reference** to the example or tutorial they have used inside the code, as a comment.

**Use of ChatGPT and Similar LLM Tools:** Use of AI tools in preliminary work, homeworks and final project is **allowed and sometimes required**.

**Course Category:** Major Area Course

### Workload and ECTS Calculation

Activities	Number	Duration (Hours)	Total Work Load
Course Duration ( Including Exam Week: 16 x Total Hours)	14	2	28
Laboratory	14	1	14
Application			
Specific practical training (if any)			
Field Activities			
Study Hours Out of Class (Preliminary work, reinforcement, etc)	13	4	52
Presentation / Seminar Preparation			
Projects	1	25	25
Homework assignment	4	5	20
Midterms ( Study duration )	1	20	20
Final ( Study duration )			
Total Workload			161

**Matrix of the Course Learning Outcomes Versus Program Outcomes**

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Deepen and develop advanced level and current knowledge in economics to an expert level based on the competencies of the economics education and acquire the skills make original thoughts, views, and contributions to science.					X
2 To comprehend the interaction between economics and related fields; to achieve original results by using expert knowledge in analysis, and evaluation of new and complex ideas.					X
3 To acquire high level skills in applied methods in economics and to be able to systematically follow new theoretical developments in applied economics.					X
4 To be able to apply existing techniques to an original research idea.					X
5 To find a new scientific method.					X
6 To broaden the knowledge of economics by publishing scientific articles related to economics in national or international refereed journals and to publish these articles in a scientific ethical way.					X
7 To be able to identify, participate in, organize and lead activities, such as panels, workshops and conferences, that aim to develop solutions for novel and interdisciplinary problems.			X		
8 To follow pioneering and innovative theories and methods in economics, to be able to use them in analysis and research and to be able to contribute to the process of becoming an information society.					X
9 To be able to analyze the relationships and processes in economics and to develop functional and effective communication networks.			X		
10 To make some scientific contributions to projects aiming to increase the productivity in business.					X
11 To be able to share his/her work and to criticize works of others by using academic networks in economics efficiently.					X

1: Lowest, 2: Low, 3: Average, 4: High, 5: Highest