

CS-300

**Data-intensive systems**

Ailamaki Anastasia, Kashyap Sanidhya

<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Communication systems	BA6	Opt.
Computer science minor	E	Opt.
Computer science	BA6	Obl.
Cyber security minor	E	Opt.
Data science minor	E	Opt.
HES - IC	E	Opt.

Language of teaching	English
Credits	6
Session	Summer
Semester	Spring
Exam	Written
Workload	180h
Weeks	14
<b>Hours</b>	<b>5 weekly</b>
Courses	2 weekly
Exercises	1 weekly
Lab	2 weekly
<b>Number of positions</b>	

**Summary**

This course covers the data management system design concepts using a hands-on approach.

**Content**

We will cover database architecture, data models, query optimization and planning, query engine and system programming, and storage systems. As our field is evolving rapidly, the list below is not exhaustive and will be adapted to reflect current technology trends.

- Entity-relationship and relational model
- Relational Algebra, Calculus, and SQL
- Memory and storage hierarchy
- Sorting and Indexing
- Query operators and optimization
- Basic synchronization mechanisms: locking and latching, task coordination
- Transaction management and concurrency control

**Learning Prerequisites****Required courses**

CS-202 Computer Systems

CS-302 Parallelism and concurrency in software

**Recommended courses**

CS-200 Computer architecture

**Important concepts to start the course**

- Excellent C/C++ programming skills
- Undergraduate computer science course(s) on algorithms and data structures

**Learning Outcomes**

By the end of the course, the student must be able to:

- Identify and understand key components of database systems
- Choose or critique design choices for DB software
- Express application information requirements and model the data of an application
- Create and design a database with a practical application in mind while justifying choices
- Explore how a DBMS works
- Report performance and possible optimizations for applications utilizing a DBMS

### Teaching methods

Lectures, exercices, and projects

### Expected student activities

- Attend the lectures to ask questions and interact with the professor
- Attend the exercises session to solve and discuss exercises about the recently taught material
- Complete a team project that covers the practical side of the course, e.g., build a set of key components in a DBMS
- Study all the material provided and recommended during classes
- Take a midterm and a final exam

### Assessment methods

- Labs (30%)
- Midterm (35%)
- Final exam (35%)

### Supervision

Office hours	Yes
Assistants	Yes

### Resources

#### Bibliography

Database Management Systems, 3rd Edition, Raghu Ramakrishnan and Johannes Gehrke

#### Ressources en bibliothèque

- [Database Management Systems / Ramakrishnan](#)

#### Websites

- <https://c416.pages.dev/>

#### Moodle Link

- <https://go.epfl.ch/CS-300>