

# IN3020/IN4020 – Database Systems Spring 2021, Last week!

## SUMMARY

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# The course

- This is a **Database Systems** course
  - **IN3020** is a bachelor level course, and this is the last lecture covering IN3020 curriculum (common with IN4020 so far), though the rest is also recommended
  - **IN4020** is a higher-level course. There will be approximately 2 x 45 minutes (5 lecture hours) of material extra for IN4020 (DBMS architecture).



# Today

- We will use about 1 hour or a bit more for summary, the exam etc. Relevant for both IN3020 and IN4020
- Note that DBMS architecture INTERDEPENDENCIES we saw last time) is a requirement for IN5020 – Distributed Systems. Relevant and required for IN4020 and recommended (but not required) for IN3020 students planning to take IN5020 any time soon.
  
- Do ask questions, but in chat.



# Highlights (Repetition)



# Goals (as stated at the beginning):

## At the end of the course, you should be able to...

- Understand what Database Management Systems (DBMS) do, how they work and how they are **implemented**
- Have a good grasp of use of SQL and how **queries are optimized**
- Have a good grasp of the theoretical & practical aspects of **database administration**
- Understand the principles of **transaction management**
- Know about the **TX management types** (like isolation levels) that modern DBMS offer, and their respective strengths/weaknesses
- Understand security in DBMS
- Have an idea about where DBMS technology & research is going



# We looked at these challenges (and more)

- PERFORMANCE, OPTIMIZATION:  
What can one do if the queries are slow?
- CONCURRENCY:  
How can one read from and write to the same database at the same time without problems? How would the performance be affected?
- RECOVERY:  
What happens if the database crashes while updating the data?



# We took up some background we needed to build the course upon

- **SQL & Relational algebra** (relevant for query optimization)
- **DBMS architecture** (relevant also for IN5020)



# The course is divided into several parts

- Main focus (all):
  - SQL, queries, relational algebra and query optimization
  - DBMS characteristics and mechanisms
    - ACID, transaction management, concurrency, isolation levels
  - Other DBMS (slightly less than previous years)
  - Security
- DBMS architecture (syllabus for IN4020 only)
- Additional bit about what **data science & analytics require of DBMS**, and a bit about emerging technologies and **database research**





# Syllabus: Egor's lectures

- SQL recap, SQL datatypes
- Indexing, index structures
- Relational algebra
- Query compilation, query plans
- Query execution
- Semantic DBMS - RDF graph & property graph databases



# Syllabus: Naci's lectures

- Overview of transaction management & buffer management
- ACID characteristics, logging
- Serialization & concurrency control, locking
- Synchronization, replication
- Isolation levels
- DBMS architecture (component inter-dependencies for IN4020)
- Security
- Overview of NoSQL database management systems & multi-model database management systems



# Seminar (recommended for all)

- Implications of data science & analytics: What they demand of a DBMS
- Modern DBMS and newer mechanisms



# For those who consider a master related to databases

Please contact us (Naci or Egor)

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# EXAM INFO

**ABSOLTELY RECOMMENDED FOR ALL**



UiO : **Institutt for informatikk**

Det matematisk-naturvitenskapelige fakultet

# Exam information

- The final exam is now a 4-hour **on-line exam**
- Evaluation: Regular A-F scale
- You **can not** use books and notes and slides and Google (ingen hjelpemidler tillat)
- You **cannot** cooperate or ask your brother/sister to do it for you! Remember that strict social distancing is required 😊
- You must have both mandatory exercises approved



# Exam information

- **Disclosure of exam assignment:** June 16 at 9:00 AM
- **Submission deadline:** June 16 at 1:00 PM

<https://www.uio.no/studier/emner/matnat/ifi/IN3020/v21/eksamen/index.html>

- **Place:** [Digital innlevering Inspera](#)



# Exam information

- This means that there will be regular exam questions,
- Some “do it in practice” exercises directing you to formulate or try things out, show results and reason about them
- Discussion question, questions that ask you to reason etc., showing your understanding of the syllabus





**In other words,  
GOOD LUCK!**

**STAY SAFE, STAY HEALTHY!**

