

# Ontology and Database Systems: Foundations of Databases

## Part 0: Introduction and Motivation

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# The Team of the Module

- Diego Calvanese: Knowledge Representation and Ontologies
- Werner Nutt: Foundations of Databases  
Office hours: Tue 4pm-5pm  
(please, let me know if you want to meet)
- Xiao Guohui: Labs and Exercises (together with Diego)

# Course Objectives

Familiarize students with

- concepts underlying database system
- concepts underlying logic-based knowledge representation (KR) languages, with an overview of
  - reasoning methods
  - application of KR techniques to data management

Present

- relational database theory
- description logics
- ontology languages.

Train fundamental mathematical skills such as

- giving formal definitions
- formulating theorems
- proving or disproving formal statements.

# Foundations of Database Systems: Overview

- Relational Query Languages:
  - logic as a query language
  - properties of queries: safety and domain independence
  - equivalence with relational algebra and SQL
  - mappings between relational algebra and relational calculus
- Query Processing and Optimization:
  - conjunctive queries
  - algebraic optimization (short)
  - containment and equivalence of conjunctive queries
  - conjunctive query minimization
- Datalog and Recursion
  - plain datalog
  - evaluation mechanisms
  - datalog with negation
- Incomplete Information
  - models of incomplete information
  - querying incomplete information

# Teaching Material

- Slides

The slides will be published on the course website (link from my home page).

- Books

- S. Abiteboul, R. Hull, and V. Vianu. *Foundations of Databases*, Addison-Wesley, 1995.

The core of the material in this part of the course can be found in the book. An electronic version is available from the home page.

- Papers

Research papers on special topics of the course will be posted on the course website.

# Course Organisation: Overall

- Lectures (2+4 hours per week)
- Labs (1+2 hours per week)
- Written coursework
- Project
- Final mark depends on
  - final exam (oral or written) [60-75% of mark]
  - written coursework [up to 15% of mark]
  - a project [25% of mark]

# Coursework

- 5 sets of exercises, posted on course page
- Students (can) work in groups of 2  
... but have to share the write-up
- Submissions by email to `werner.nutt AT unibz.it`
- No plagiarism!
- Idea: coursework (CW) marks cannot decrease the final mark.  
Only those parts of the CW count that are better than the final exam.  
For the other parts, the exam mark is substituted.
- Exercises are crucial for learning: the material and the skills!