**Database & Information Systems Group: Courses Overview**

**Bachelor**

**Computer Science I**

Basic knowledge in computer science

**Computer Science II**

Basic knowledge in programming

**Computer Science III**

Tree structures

**Formal Systems / KI**

Basic knowledge in First-Order Logic & reasoning

**Databases**

B Inf 2033: Database III 5 CP

**Development of a Database Application**

B Inf 1891/92/93: Fachpraktikum III 10 CP

**Lecture: Databases**

B Inf 1890: Vertiefung Databases 5 CP

**Practical training: SQL**

B Inf 1893/184/185: Fachpraktikum I 7 CP

**Module: Advanced Databases**

B Inf 1306: Verteilte Databases 5 CP

**Project work**

Advanced Research Training - Applied System Development

B Inf 1000: ACuß. at Frankfurt

**Master Thesis**

Term Independent 12 CP

**Bachelor Thesis**

Term Independent 12 CP

**Semester dependent on**

WS 19/20

**Term independent**

SS 19 (every third semester)

**Irregular**

Practical training: SQL

In this lab course, the database programming language SQL is taught in several sub-modules. The course will cover topics amongst others like referential integrity, indexing, access control and embedding a database into Java code. The practical training is carried out in groups consisting of 3 or 4 students. For every exercise, the presentation of the solutions is done for each group with their supervisor.

**Development of a Database Application**

In this lab course, students should develop a real-world database application. E.g. a data warehouse that simulates the functionality of Unity and Fortnite. Besides the mandatory databases, it is up to the students to decide on which aspects of the application they want to focus on. The course aims to simulate a realistic Application development and to familiarize with new techniques.

**Advanced Databases**

The Advanced Database module gives the student the possibility to include a Master degree database lecture (Semistructured Data and XML, Deductive Databases or Semantic Web) in the Bachelor degree. Note that these lectures are on a three semester cycle and will require a basic understanding of First-Order Logic and reasoning that are taught in the formal systems module.

**Advanced Research Training**

For the Advanced Research Training the student will be assigned a project that is related to our current research. This project will give the student the opportunity to become acquainted with a more in-depth topic in a database research field. Thus it is highly recommended to do this project work as a preparation for a potential Bachelor thesis. Please contact us if you are interested.

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**Master**

**Semistructured Data and XML**

The course introduces the general concepts of semistructured data and their evaluation in XML and the main languages and concepts of the XML world are then investigated both in theory and practice.

- Early Data Models and database concepts (network model, object-oriented model)
- Semistructured Data (data integration, metamodel handling, data models and languages)
- The XML Data Model and Languages (DTD, XSL, XML)
- The addressing formalism XPath
- The query language XQuery
- The transformation language XSLT
- XML Schemas, XLink, DOM/SAX, XML Databases/Mappings

**Practical training: XML**

In this course, concepts around XML are taught in several subsequent units: XML, DTD, XPath/XQuery, XSLT, XML Schema, DOM, XSLT, XPath, DOM/SAX, SQL. The practical training is carried out in groups consisting of 3 or 4 students. For every exercise, the presentation of the solutions is done for each group with their supervisor.

**Deductive Databases**

The course introduces theoretical/logical aspects of databases and applies them to deductive databases.

- The first-order-logic-based twin to the relational algebra: Relational Calculus
- Reasoning: First-Order Model Theory; Residuation Calculus
- Deductive Databases - Positive Recursive Datalog
- Advanced Datalog: Datalog with Negation, Well-Founded Semantics, Stable Semantics

**Semantic Web**

The course introduces the underlying concepts of the Semantic Web:

- RDF: N3 and RDFS/XML, formal semantics
- SPARQL: the query language for RDF data
- RDF, OWL, reasoning RDF data with additional reasoning
- Description Logic: the logic underlying OWL
- Practical experiments with RDF, Java, Reasoners etc.

**Practical training: Semantic Web**

In this course, concepts around Semantic Web Technologies are taught in several subsequent units: SPARQL, Java, RDF4J, Ontology Design, Hermit, Protégé, Ontology construction and usage and Linked Open Data. The practical training is carried out in groups consisting of 3 or 4 students. For every exercise, the presentation of the solutions is done for each group with their supervision.

**Web Data Integration and Data Management**

In this project seminar the students have a choice between a selection of recent research papers. The aim of the seminar is to get the students to prepare a talk on the basis of some selected papers, which will be further discussed with the other participants. Most topics will involve a tool that the participants are expected to familiarize themselves with and test out the functionality and limitations.

**Advanced Research Training**

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