COURSE PRESENTATION FORM – ACADEMIC YEAR 2013/2014

COURSE NAME	**Ontology and Database Systems**
COURSE CODE	72119
LECTURER	Diego Calvanese (8CFU) and Werner Nutt (4 CFU)
TEACHING ASSISTANT	Elena Botoeva
TEACHING LANGUAGE	English
CREDIT POINTS	12
LECTURE HOURS	72
EXERCISE HOURS	36
OFFICE HOURS LECTURER	Diego Calvanese: during the lecture time span Friday 16:00–18:00, Faculty of CS, POS Building, piazza Domenicani 3, office 2.07; outside of the lecture time span by previous email appointment. Werner Nutt: during the lecture time span Wednesday 14:00–16:00, Faculty of CS, POS Building, piazza Domenicani 3, office 2.09; outside of the lecture time span by previous email appointment.
OFFICE HOURS TEACHING ASSISTANT	Elena Botoeva: during the lecture time span Wednesday 16:00–18:00, Faculty of CS, POS Building, piazza Domenicani 3, office 2.06; outside of the lecture time span by previous email appointment.
PREREQUISITES	Notions of • First-order logic as taught in an introductory BSc course on Mathematical Logic; • Relational databases as taught in an introductory BSc course; • Java programming and SQL with JDBC Connectivity.
OBJECTIVES	The aim of the course is to familiarize students with the concepts underlying database system and classical logic-based knowledge representation languages, with an overview of the reasoning methods for them, and of the application of techniques developed in knowledge representation to classical data management problems. Most of the course will focus on relational database theory, description logics and ontology languages. In addition to studying the technical material, students will train fundamental mathematical skills such as giving formal definitions, formulating theorems, and proving or disproving formal statements.
SYLLABUS	• Modeling information through relations and ontologies • Logic as a query languages

- Query answering over databases and ontologies
- Foundations of query processing
- Relational query languages with recursion
- Modeling incomplete information
- Description Logics
- Ontology based data access
- Reasoning in the DL-Lite family
- Reasoning in the ALC family

TEACHING FORMAT

The course is organized as frontal lectures on the course topics, possibly complemented by monographic seminars that serve as a starting point for discussing the techniques involved. During lab sessions the students will develop their theoretical skills by elaborating small problems and familiarize themselves with the usage and internals of state-of-the-art tools for managing and querying relational data sources through an ontology, and will work on a project.

ASSESSMENT

The final mark will be based on:

1. a final oral or written exam [60–75% of mark]
2. a project [25% of mark]
3. written coursework [up to 15% of mark]

To pass the exam, both the final exam (1) and the project (2) have to be passed, while the written coursework is optional. The final mark is computed as a weighted average of the exam mark (60-75%), the project mark (25%), and the coursework mark (up to 15%). If the coursework is accomplished, it can substitute the final exam for up to 15% (the better of the two marks between final exam and coursework is considered). In case of a positive mark, project and coursework mark will count for all 3 regular exam sessions of the Academic Year (i.e., if the student fails or does not take the final exam, (s)he keeps the coursework and the project mark and only needs to retake the final exam).

READING LIST

- *Foundations of Databases:* S. Abiteboul, R. Hull, and V. Vianu, Addison Wesley, 1995 (available online)
- *The Description Logic Handbook: Theory, Implementation and Applications* (2nd edition). Cambridge University Press, 2007. ISBN 9780521150118. Edited by F. Baader, D. Calvanese, D. McGuinness, D. Nardi, P. F. Patel-Schneider.
- *Ontologies and databases: The DL-Lite approach*. Diego Calvanese, G. De Giacomo, D. Lembo, M. Lenzerini, A. Poggi, M. Rodriguez-Muro, and R. Rosati. In *Semantic Technologies for Informations Systems - 5th Int. Reasoning Web Summer School (RW 2009)*, volume 5689 of Lecture Notes in Computer Science, pages 255-356. Springer, 2009. Available at http://www.inf.unibz.it/~calvanese/papers-html/RW-2009.html

Lecture notes and additional reading material covering the course topics will be provided during the course and made available in the course web page.

SOFTWARE USED

- Protégé ontology editor
- MySQL or Postgres database engine
- Ontology-based Data Access Tools from http://ontop.inf.unibz.it/

LEARNING OUTCOME

After the course, students will

- be familiar with the theoretical concepts underlying databases and query languages
- have acquired an understanding of the advanced languages, methodologies, and the use of knowledge representation techniques, also in the context of accessing and querying information sources
- understand automated reasoning techniques and formal semantics for these languages
- be able to formulate theoretical statements about databases and ontologies and to prove or disprove them.

COURSE PAGE

http://www.inf.unibz.it/~calvanese/teaching/odbs/