### COURSE PRESENTATION FORM - ACADEMIC YEAR 2013/2014

<table>
<thead>
<tr>
<th>COURSE NAME</th>
<th>Ontology and Database Systems</th>
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<tbody>
<tr>
<td>COURSE CODE</td>
<td>72119</td>
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<tr>
<td>LECTURER</td>
<td>Diego Calvanese (8CFU) and Werner Nutt (4 CFU)</td>
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<tr>
<td>TEACHING ASSISTANT</td>
<td>Elena Botoeva</td>
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<tr>
<td>TEACHING LANGUAGE</td>
<td>English</td>
</tr>
<tr>
<td>CREDIT POINTS</td>
<td>12</td>
</tr>
<tr>
<td>LECTURE HOURS</td>
<td>72</td>
</tr>
<tr>
<td>EXERCISE HOURS</td>
<td>36</td>
</tr>
</tbody>
</table>

**OFFICE HOURS**

<table>
<thead>
<tr>
<th>LECTURER</th>
<th>Location and Time</th>
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<tbody>
<tr>
<td>Diego Calvanese</td>
<td>Faculty of CS, POS Building, piazza Domenicani 3, office 2.07; outside of the lecture time span by previous email appointment.</td>
</tr>
<tr>
<td>Werner Nutt</td>
<td>Faculty of CS, POS Building, piazza Domenicani 3, office 2.09; outside of the lecture time span by previous email appointment.</td>
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<tr>
<td>Elena Botoeva</td>
<td>Faculty of CS, POS Building, piazza Domenicani 3, office 2.06; outside of the lecture time span by previous email appointment.</td>
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**PREREQUISITES**

- 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)

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/