COURSE DESCRIPTION – ACADEMIC YEAR 2016/2017

Course title	**Semantic Technologies**
Course code	74016
Scientific sector	INF/01
Degree	European Master's Program in Computational Logic (LM-18)
Semester	1
Year	1
Credits	12
Modular	Yes
University	UniBZ

Total lecturing hours	72
Total lab hours	24
Total exercise hours	12
Attendance	Not compulsory
Prerequisites	Knowledge of Java programming.
Course page	https://ole.unibz.it/

Specific educational objectives	The course belongs to the type "caratterizzanti – discipline informatiche". The course is part of the advanced topics offered within the degree and can be selected by the student as one of the three which must be completed according to the study plan. The aim of the module is to make the students familiar with the use of semantic based technologies for building information systems. In particular the module is focused on the so called Semantic Web; by presenting technologies and applications centred on Semantic Web technologies. The module will focus on the theoretical background of various languages on the Semantic Web such as RDF, SPARQL, OWL, and F-Logic (Programming), and the practical use of these languages on the Semantic Web. In addition, the course will focus on important application areas for Semantic Web technology, namely Web Services and Life Sciences. After the completion of this course, students will be familiar with technologies and formalisms which underpins the Semantic Web. Moreover, they will able to apply them in order to build semantically rich applications. In addition, students will have the possibility to complement their knowledge of Semantic Web by studying semantic based approaches to closely related research areas (e.g. Computational Linguistics).

Module 1	**Semantic Technologies**
Module code	74016A
Module scientific sector	INF/01
Lecturer	Enrico Franconi
Contact	Piazza Domenicani 3, Room 3.06, franconi@inf.unibz.it, 0471-016120
Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	Anytime, by previous appointment by email to the lecturer.
Lecturing assistant (if any)	Guohui Xiao
Office hours LA	Anytime, by previous appointment by email to the assistant.
Credits	8
Lecturing hours	48
Lab hours	24

Exercise hours	--
List of topics	• Adding semantic metadata to data • Metadata representation in RDF and RDFS • Querying the metadata with SPARQL • Applicative frameworks and protocols • Rich modelling languages • Metadata modelling issues • Architectures for semantic applications • Linked open data and information integration
Teaching format	Frontal lectures plus exercises and a project in small groups that will allow the students to gain practical experience with the technologies introduced during the lectures.

Module 2	**Seminars in Data and Knowledge Engineering**
Module code	74016B
Module scientific sector	INF/01
Lecturer	Werner Nutt
Contact	Piazza Domenicani 3, Room 2.09, nutt@inf.unibz.it, 0471-016126
Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	During the lecture time span: by previous appointment, day of week and time will be determined at lecture start.
Lecturing assistant (if any)	--
Office hours LA	--
Credits	4
Lecturing hours	24
Lab hours	--
Exercise hours	12
List of topics	• Seminars on advanced topics in Data and Knowledge Engineering • Discussion of research papers in key areas of Data and Knowledge Engineering
Teaching format	The course is organized as a series of seminars, in which students present a scientific paper followed by a group discussion. In the first weeks students search for and select papers. The total number of papers assigned to each student may depend on the number of students, but will not be more than 1 or 2 papers. The lecturer will assist students in studying the papers, including the most relevant related work, and in preparing the presentation.

Learning outcomes	Knowledge and understanding • Knowledge of the state of the art of knowledge representation and reasoning techniques for knowledge bases • Thoroughly understand the scientific method of investigation. Applying knowledge and understanding • Be able to define an algorithmic solution to a computational problem and to estimate its complexity. • Be able to identify new application requirements and business opportunities in the field of systems based on data and knowledge.

	Making judgments • Be able to independently select the documentation required to keep abreast of the frequent technological innovations in the field by using a wide variety of documentary sources: books, web, magazines. • Be able to identify reasonable work goals and estimate the resources required to achieve the objectives. • Be able to plan and re-plan a technical project activity aimed at building an information system and to bring it to completion by meeting the defined deadlines and objectives. Communication skills • Be able to present in a fixed time the content of a scientific / technical report in front of an audience also composed of non-specialists. • Be able to structure and prepare scientific and technical documentation describing research publications. Ability to learn • Be able to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation. • Be able to independently keep up to date with developments in the most important areas of Computer Science.

Assessment	• A compulsory written report on a project solving a given problem on topics covered in M1 done in small groups handed in at the end of the M1 module; • A written exam with exercises, and verification and transfer of knowledge questions course on topics covered in M1; • A presentation of the paper(s) and active participation in the seminar course - covered in M2; • An oral exam on topics covered in M2.
Assessment language	English
Evaluation criteria and criteria for awarding marks	Optional written project report (counting 40% of the final mark): ability to work in a team, creativity, skills in critical thinking, ability to summarize in own words, correctness of solutions, clarity of answers. Written final exam: correctness of answers, clarity of answers, ability to summarize, evaluate, and establish relationships between topics, skills in critical thinking, ability to summarize in own words. Presentation of the paper(s) and active participation in the seminar (70%): this part of the assessment mainly covers the communication skills, during discussions the students can also show their ability to classify and judge research publications. Final oral exam (30%): the exam consists of questions on the topics presented in the seminars, in particular about the other papers. In this part, students mainly demonstrate their ability to learn by showing that they have internalized the topics discussed in the seminar.

Required readings	**Module 1: Semantic Technologies** The course will use material from the following books:

	• Grigoris Antoniou, Paul Groth, Frank van Harmelen, and Rinke Hoekstra. 2012. A Semantic Web Primer (3rd ed.). The MIT Press. • Dean Allemang and James Hendler. 2011. Semantic Web for the Working Ontologist (2nd ed.). Morgan Kaufmann. • Liyang Yu. 2014. A Developer's Guide to the Semantic Web (2nd ed.). Springer. **Module 2: Seminars in Data and Knowledge Engineering** The reading list will be provided/decided on during the seminar.
Supplementary readings	Additional sources will be announced during the course.