Syllabus

Course Description

Course Title	Data Semantics
Course Code	73070
Course Title Additional	
Scientific-Disciplinary Sector	INFO-01/A
Language	English
Degree Course	Master in Computing for Data Science
Other Degree Courses (Loaned)	
Lecturers	Prof. Enrico Franconi, franconi@inf.unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/943
Teaching Assistant	
Semester	Second semester
Course Year/s	1
CP	6
Teaching Hours	40
Lab Hours	^20
Individual Study Hours	90
Planned Office Hours	
Contents Summary	Data Modelling in the data science pipeline Constraints, Normal Forms, Elementary Facts Lossless Transformations Object-oriented Data Modelling RDF and Semantic Metadata Conceptual Modelling
Course Topics	This course examines the essential role of data semantics and modelling in the data science pipeline. It covers key topics in relational databases such as data normalisation, and both object-oriented and conceptual modelling approaches. Special focus is

	given to integrity constraints, lossless data transformations, and how advanced normal forms help represent fundamental data units accurately. The course also introduces semantic modelling with RDF, ontologies, and metadata, demonstrating how data structures can be aligned with business meaning. Finally, it explores the relationship between relational algebra and SQL to deepen students' understanding of query formulation, data integrity, and the management of database views.
Keywords	Data Modelling Semantic Technologies Conceptual Modelling
Recommended Prerequisites	
Propaedeutic Courses	
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.
Mandatory Attendance	Attendance is not compulsory, but non-attending students have to contact the lecturer at the start of the course to agree on the modalities of the independent study.
Specific Educational Objectives and Learning Outcomes	The course belongs to the type "caratterizzanti – discipline informatiche". This course examines the essential role of data semantics and modelling in the data science pipeline. Knowledge and understanding: • D1.1 - Knowledge of the key concepts and technologies of data science disciplines • D1.5 - Knowledge of principles and models for the representation, management and processing of complex and heterogeneous data Applying knowledge and understanding: • D2.1 - Practical application and evaluation of tools and techniques in the field of data science Making judgments • D3.2 - Ability to autonomously select the documentation (in the form of books, web, magazines, etc.) needed to keep up to date in a given sector

	Communication skills • D4.1 - Ability to use English at an advanced level with particular reference to disciplinary terminology Learning skills • D5.2 - Ability to autonomously keep oneself up to date with the developments of the most important areas of data science
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	- A compulsory written report on a software project solving a given problem done in small groups handed in after the end of the course and before the final written exam; - a final oral exam with exercises, and verification and transfer of knowledge questions. The assessment for non-attending students is the same as above.
Evaluation Criteria	- Compulsory written project report (counting 30% 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. - Oral 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. The criteria for non-attending students are the same as above.
Required Readings	The reading material for the course will be provided during the lectures; one important textbook is the following: Hogan, Aidan: The Web of Data. Springer, 2020. ISBN 978-3-030-51579-9 Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it
Supplementary Readings	The course page provides plenty of additional material. More sources will be announced during the course.
Further Information	Software used:

	Students will use the following software on their computers; installation instructions are provided in the course webpage. Additional software to be installed may be pointed out during the course. Python RDFLib Protégé DLV Ontop
Sustainable Development Goals (SDGs)	Quality education