


COURSE DESCRIPTION – ACADEMIC YEAR 2022/2023

Course title	Information Systems Design
Course code	73061
Scientific sector	INF/01
Degree	Master in Computational Data Science (LM-18)
Semester	1
Year	1
Credits	6
Modular	No

Total lecturing hours	40
Total lab hours	20
Attendance	Mandatory
Prerequisites	None
Course page	Microsoft Teams, https://ole.unibz.it/

Specific educational objectives	<p>The course belongs to the type "caratterizzanti – discipline informatiche".</p> <p>The main goal of the course is to study and put into practice languages, methodologies, and techniques for the conceptual modeling of data, towards the realization of correct, effective information systems for organizational support. In this light, the course aims at providing professional skills and knowledge.</p> <p>In particular, the course provides principles and methods to support the modeler in the creation of conceptual models that suitably reflect the relevant aspects of an organization. This is done in two parts. The first part focuses on the relation between information systems and the entities, events (processes, changes, states) and types in reality that they are supposed to represent. This part also investigates the role of Ontology (as a study of this underlying reality) for the design, assessment and management of information systems. In particular, for a systematic design process that favors information systems interoperability. In the second part, we study how these conceptual models of reality influence the design of information systems as computational artifacts. Furthermore, we investigate a number of important Design Patterns and Anti-Patterns and show how they facilitate the process of model-driven information systems engineering.</p>
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Lecturer	Mattia Fumagalli
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Scientific sector of lecturer	INF/01
Teaching language	English
Office hours	To be arranged beforehand by email.
Lecturing Assistant (if any)	--
Contact LA	--
Office hours LA	--

<p>List of topics</p>	<ul style="list-style-type: none"> • Design of complex static object structures and role-based modelling • Design of complex relational properties • Design of complex enterprise events • Verification and validation of models • Patterns and anti-patterns • Model-based code generation and mapping to different implementation platforms
<p>Teaching format</p>	<p>Frontal lectures, modelling exercises, projects in groups.</p>
<p>Learning outcomes</p>	<p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • D1.2 - Understanding of the skills, tools and techniques required for an effective use of data science • D1.5 - Knowledge of principles and models for the representation, management and processing of complex and heterogeneous data • D1.10 - Knowledge of languages, methodologies and architectures for modelling data, processes and organisations <p>Applying knowledge and understanding:</p> <ul style="list-style-type: none"> • D2.1 - Practical application and evaluation of tools and techniques in the field of data science • D2.10 - Application of languages, tools, and methods for the design of information systems and their corresponding software applications for data, process, and organization management <p>Making judgments</p> <ul style="list-style-type: none"> • 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 <p>Communication skills</p> <ul style="list-style-type: none"> • D4.1 - Ability to use English at an advanced level with particular reference to disciplinary terminology • D4.2 - Ability to present one's work in a clear and comprehensible way in front of an audience, including non-specialists • D4.3 - Ability to structure and draft scientific and technical documentation • D4.5 - Ability to interact and collaborate in the implementation of a project or research with peers and experts <p>Learning skills</p> <ul style="list-style-type: none"> • D5.1 - Ability to autonomously extend the knowledge acquired during the study course • D5.3 - Ability to deal with problems in a systematic and creative way and to appropriate problem solving techniques
<p>Assessment</p>	<p>The assessment of this course consists of two parts:</p> <ul style="list-style-type: none"> • A project assignment: for the project assignment, a written project report including the produced models must be handed in on the pre-announced date and time. 

	<ul style="list-style-type: none"> An oral exam with verification and comprehension questions.
Assessment language	English
Assessment Typology	Monocratic
Evaluation criteria and criteria for awarding marks	<p>70% collective project assignment, 30% individual oral exam; ALL parts must be positive!</p> <ul style="list-style-type: none"> Oral exam: creativity, skills in critical thinking; ability to summarize in own words and concisely present (intermediate and final) results; clarity of answers, mastery of language, ability to clearly explain, summarize, evaluate, and establish relationships between topics; demonstrate a deep understanding of the subjects covered during the course and be able to describe them precisely and clearly. Relevant for collective project assignment: ability to work in a team, creativity, introduce oneself into new topics and research literature on your own to create a deep understanding; demonstrate a deep understanding of the subjects covered during the course and be able to describe them precisely and clearly.
Required readings	<ul style="list-style-type: none"> Guizzardi, G., <i>Ontological Foundations for Structural Conceptual Models</i>, Universal Press, 2005. Guarino, N. (Ed.). (1998). <i>Formal ontology in information systems: Proceedings of the first international conference (FOIS'98), June 6-8, Trento, Italy</i> (Vol. 46). IOS press. <p>Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it</p>
Supplementary readings	<ul style="list-style-type: none"> Olivé, A.: <i>Conceptual Modeling of Information Systems</i>. Springer, 2007. ^[1]_{SEP} Tilley, S., 2019. <i>Systems analysis and design</i>. Cengage Learning.
Software used	<p>Advanced Conceptual Modeling Tools for OntoUML modeling (https://github.com/OntoUML/ontouml-vp-plugin, please see free community version of Visual Paradigm: https://www.visual-paradigm.com/download/community.jsp)</p>