Date (dd/mm/yyyy)	Description	Grade	Credits
01/02/2021	**Large-Scale and Multi-Structured Databases**	29/30	9
At the end of the course the student will have acquired knowledge about the tools and methodologies for the design of non-relational databases. In particular, the student will be able to manage the archiving, updating and recovery of complex and multi-structured data, even of very large dimensions. The student will acquire also knowledge about the architectures, performances and costs of modern infrastructures for the management of complex data, both from the point of view of the quantity of information and from the point of view of their structure.			
22/02/2021	**Distributed Systems and Middleware Technologies**	30/30	6
The course is aimed at providing students with proper conceptual and technological tools for the design, analysis, and development of modern distributed applications. After introducing models, paradigms and algorithms for distributed software, various types of middleware systems are presented, focusing on the issues they have been designed to deal with.			
25/02/2021	**Data Mining and Machine Learning**	29/30	12
The students who successfully complete the course will have a solid knowledge of the main techniques used in data preprocessing, data warehouse, frequent pattern mining, frequent sequential pattern mining, graph mining, classification, prediction, clustering and outlier detection. This knowledge will allow them to tackle each type of data mining problem and to identify the most suitable technique for solving it.			
11/06/2021	**Cloud Computing**	30/30 cum Laude	9
The objective of the course is to teach topics in cloud computing, including also hands-on technical knowledge. Foundation principles of cloud computing and advanced technologies are discussed covering concepts of the cloud infrastructure as well as cloud platforms. Cloud programming models and practical examples of cloud application deployments are also covered. At the end of the course, students are expected to develop in deep knowledge of the cloud computing infrastructure and platforms, required to understand, design, and analyze current and future cloud infrastructure and applications.			
07/07/2021	**Business and Project Management**	30/30	9
The course has the goal of introducing students to the complexity of management of modern companies. It may be considered a short version of an MBA program. The course will be supplemented by a new module on Project Management (30 hours), which will offer the foundations of the management of complex business initiatives.			
22/07/2021	**Optimization Methods and Game Theory**	30/30	6
The student who successfully completes the course will be able to demonstrate a solid knowledge of the methodologies and algorithms concerning solution of advanced nonlinear optimization and game theory problems. They will acquire ability in the use of MATLAB for solving nonlinear optimization and game theory problems.			
16/09/2021	**Internet of Things**	30/30	9
Students, who successfully complete this course, will become aware of the theoretical background on the Internet of Things (IoT) paradigms and its enabling technologies, as well as of the basic methodologies for developing IoT systems and applications.			

18/01/2022	**Computational Intelligence and Data Engineering**	30/30	9
This course covers the theory and application of a series of computational intelligence techniques, including artificial neural networks, fuzzy inference systems and genetic algorithms. The focus is on the design and development of computationally intelligent systems with human-like capabilities in terms of reasoning, learning and adaptation. Special emphasis will be placed on linking computational intelligence techniques to real world applications and projects.			
21/01/2022	**Process Mining and Intelligence**	29/30	6
The course aims to provide knowledge and experience essential for designing and developing enterprise information systems that are driven by workflow models. Such software systems mainly support the way that machines, people, work, activities, events, tools are arranged by collaborating organizations for efficiently delivering goods and services.			
14/02/2022	**Multimedia Information Retrieval and Computer Vision**	30/30 cum Laude	9
The course aims at providing students with solid background on Multimedia Information Retrieval, Multimedia Content Based Retrieval, Automated Multimedia Content Understanding, Multimedia Data Mining, Computer Vision. At the end, students will understand the challenges and issues related to effectiveness, efficiency, and scalability when dealing with very large (web scale) multimedia data sets.			
18/03/2022	**Human Language Technologies**	30/30	9
The students will learn fundamental techniques, algorithms and models used in natural language processing. They will get an understanding of the architectures of typical text analytics applications and of libraries for building them. Also, they will gain an expertise in design, implementation and evaluation of applications that exploit analysis, interpretation and transformation of texts.			
14/06/2022	**Symbolic and Evolutionary Artificial Intelligence**	28/30	6
Students are expected to be able to understand the principles of multi-objective optimization and to develop their own algorithm for multi-objective evolutionary optimization. Moreover, they will be able to understand and apply the principles of reinforcement learning, to solve complex learning problems there the alternative learning methods struggle. Students are also expected to be able to use non-Archimedean algorithms to numerically solve lexicographic multi-objective problems, including game theory problems involving priorities among the payoffs. Finally, the students are expected to be aware of the challenges posed by the design of hardware accelerators for machine learning and neural networks, with special emphasis on the use of alternative representations for small-precision real numbers, vectorized CPUs, etc.			