Degree Course
"Complex Administration and Organization Sciences"
Teaching Unit
Computer Science and Data Management
Academic Year, Course Year, Semester, CFU
A.Y. 2021/2022, I° Year, 1° Semester, 8 CFU
Teacher
Prof. Giuseppe Agapito

Content	Computer Science and Data Management, SSD: ING-INF/05 Information Processing Systems.
Teacher	Prof. Giuseppe Agapito RTD Tipo B, (S.C. 09/H1, S.S.D.: ING-INF/05 Sistemi di Elaborazione delle Informazioni), Department of Law, Economics, and Sociology Univeristy "Magna Græcia" of Catanzaro. e-mail: agapito@unicz.it The timetable of the lectures is published on the website of the Department of Law, Economics, and Sociology. Office hours dates and times are available inside the page personal teacher web page. The teacher also receives by appointment before and after lessons and exams.
Teaching Unit	The course aims to provide students with the fundamental knowledge to understand organizations' needs and respond to them through the production of information to support decisions obtained through the analysis of the large quantities and varieties of data accumulated over time.
Methods and Criteria for Learning Assessment	**Knowledge and understanding skills**: the course aims to provide the knowledge of the main problems related to the organization and automatic management of the data accumulated and available in public and private organizations. **Applying knowledge and understanding**: the student will be able to use the methodologies learned to support data analysis to produce precise and essential information, which allows them to guide strategies and corporate vision through a data-driven approach. **Autonomy of judgment**: the student will express a critical attitude to plan, design, and manage data analysis workflows that provide decision-makers with summary information and predictive models helpful in improving decision-making and business processes. **Communication skills: t**he student will Acquire the ability to expose the topics covered with appropriate terminology**.** **Learning Abilities**: the student will acquire the theoretical and practical knowledge to independently address and solve new problems related to data management, which may arise both during studies and during work.

Program	**First Part**:
	Computer Science
	    Automatic Information Processing
	    Automatic troubleshooting
	    Concept of algorithm
	    Properties of algorithms
	    Programming languages
	        machine language
	        high-level programming languages

	programs.
	IT Security
	Fundamental Concepts
	Security and Privacy

Second Part:

Data Management

Introduction to Data Mining and Data Management
    Possible use cases
    The process of Discovering knowledge

Understanding and preparing the data
    Properties of the different types of data
    Data quality
    Preprocessing
    Imputation of Missing Data

Data Warehousing
    Basic Concept
    Differences between Database Systems and Data Warehouses
    Data Warehousing Architecture

Supervised Learning
    Decision Trees Classification
    Bayesian Classification
    Support Vector Machine

Unsupervised Learning
    Clustering
    Association rules
    Outlier Detection

Text Ming
    Introduction to Text Mining
    Text analysis methodologies
    Text mining algorithms and tools

Big Data
    Introduction to Big Data
    Big Data Analysis

Tutorials
    Data management using Weka, Knime, Python, R, Spark, Hadoop frameworks.

Student workload

The amount of study required to prepare for an exam varies according to the personal abilities of the individual student. The indicated program requires approximately a personal study of 120 hours.

Topics: **Computer Science**
References and supplementary material provided by the teacher.

Topics: **Introduction to Data Mining and Data Management**
[1] Chapter 1 (Tot. **33** pages)
Lectures notes provided by the teacher.

Topics: **Understanding and preparing the data**
[1] Chapter 2, 3. (Tot. **83** pages)
Lectures notes provided by the teacher.

Topics: **Data Warehousing**
[1] Chapter 4 (Tot. **53** pages)
Lectures notes provided by the teacher.

Topics: **Supervised Learning**
[1] Chapters 8, 9.1, 9.3 (Tot. **68** pages)

	Lectures notes provided by the teacher. Topics**: Unsupervised Learning** [1] Chapter 6**,** 10, 12. **(**Tot. **113** pages**)** Lectures notes provided by the teacher. Topics**: Text Mining** [3] Chapters 1, 2, 8. (Tot. **68** pages) Lectures notes provided by the teacher. Topics**: Big Data** [2] Chapters 1 (Tot. **33** pages) Lectures notes provided by the teacher. Total Number of pages (**418)** to study concerning the course's **8 CFU** (**min** number of pages **400**, **max** number of pages **480**)
Teaching Methods	The course will be divided into a part of theoretical lectures in the classroom and another part of assisted exercises that will be held in the laboratory or classroom and require PCs made available in the University laboratories or the classroom through your own PC. The activities are mainly aimed at data analysis using software frameworks such as Weka, Python, R, Spark, Hadoop, and Knime suitable for Data Management.
Textbooks and Further References	• [1] Data Mining Concepts and Techniques Third Edition. Jiawei Han, Micheline Kamber, Jian Pei. Morgan Kaufmann - Elsevier • [2] BIG DATA. Principles and Paradigms. Rajkumar Buyya, Rodrigo N. Calheiros, Amir Vahid Dastjerdi. MORGAN KAUFMANN – Elsevier. • [3] An Introduction to Text Mining. "Research Design, Data Collection, and Analysis. Gabe Ignatow, Rada Mihalcea. SAGE **Further references** • [4] Introduzione alla programmazione in MATLAB**.** Autori: A. Campi, E. Di Nitto, D. loiacono, A. Morzenti e P. Spoletini. Società Editrice Esculapio. • Lectures notes provided by the teacher and supplementary useful material will be made available for the students attending the course on the eLearning platform of university (https://elearning.unicz.it/).
Support Activities	In addition to the front lectures, students will be supported during laboratory exercises. Furthermore, distributed platforms (Dropbox, GoogleDrive, etc.) are used to share educational material (slides, examples, practices, and handouts).
Frequency Mode	It is desirable to attend lectures and exercises, read carefully the provided didactic material and meticulously follow the instructions provided by the teacher during the course. The slides do not replace the reference texts but offer precise detail on the program carried out.
Methods and Criteria for Learning Assessment	The course does not include intermediate evaluation tests. The final exam will be held orally. Passing the exam is proof of having acquired the knowledge and skills specified in the course's educational objectives. The maximum mark of each test is 30L /30.

The final mark reflects what is reported in the following table.

Final Mark	Knowledge and understanding of the subjects	Competence in the analysis and synthesis	Use of references, primarily bibliographic
Fail	Major drawbacks. Relevant inaccuracy	Irrelevant. Frequent generalization. Inability to synthesize	Improper
18-20	At the threshold level. Obvious imperfections	Capacities are barely enough.	Merely appropriate
21-23	Conventional knowledge.	She or He can carry out correct analyzes and syntheses. Argue logically and consistently.	She or He uses standard references.
24-26	Good knowledge of the subject.	She/He has good analysis and synthesis skills. The arguments are expressed consistently.	She or He uses standard references.
27-29	More than good knowledge	She or He has considerable skills in analysis and synthesis.	She or He delved into the topics.
30-30L	Considerable knowledge	She or He has considerable skills in analysis and synthesis.	Valuable insights.