Master's Degree in
"PUBLIC ADMINISTRATIONS AND SOCIETIES" (LM-63)
Computer Science and Data Management
A.Y. 2024/2025, I° Year, 1° Semester, 8 CFU (48 Hours)
Prof. Giuseppe Agapito, SSD ING-INF/05

Content	Computer Science and Data Management, SSD: ING-INF/05 Information Processing Systems.
Teacher	Prof. Giuseppe Agapito Assocciate Professor, (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 in the personal teacher web page. The teacher also receives by appointment before and after lessons.
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 aim 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	**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 Knime, and Stata 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.

<table>
<tr><td></td><td>Total Number of pages (418) to study concerning the course's 8 CFU (min number of pages 400, max number of pages 480)</td></tr>
<tr><td>Teaching Methods</td><td>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 Stata, and Knime suitable for Data Management.</td></tr>
<tr><td>Textbooks and Further References</td><td>• [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/).</td></tr>
<tr><td>Support Activities</td><td>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).</td></tr>
<tr><td>Frequency Mode</td><td>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.</td></tr>
<tr><td>Methods and Criteria for Learning Assessment</td><td>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.
<table>
<tr><th>Final Mark</th><th>Knowledge and understanding of the subjects</th><th>Competence in the analysis and synthesis</th><th>Use of references, primarily bibliographic</th></tr>
<tr><td>Fail</td><td>Major drawbacks. Relevant inaccuracy</td><td>Irrelevant. Frequent generalization. Inability to synthesize</td><td>Improper</td></tr>
<tr><td>18-20</td><td>At the threshold level. Obvious imperfections</td><td>Capacities are barely enough.</td><td>Merely appropriate</td></tr>
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		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.