Syllabus

Course Description

Course Title	Basics in Data Management
Course Code	27359
Course Title Additional	
Scientific-Disciplinary Sector	IINF-05/A
Language	English
Degree Course	Bachelor in Economics and Management
Other Degree Courses (Loaned)	
Lecturers	Ing. Fabio Persia, Fabio.Persia@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/35741
Teaching Assistant	Dr. Riccardo Billero
Semester	Second semester
Course Year/s	1
CP	5
Teaching Hours	36
Lab Hours	36
Individual Study Hours	
Planned Office Hours	
Contents Summary	The course is designed to acquire basic knowledge on data formats, organization and data extraction techniques as well as basic skills in data analysis and processing. The course also introduces the software R and provides a bootcamp on Access. Specifically, it provides an overview of data management and an introduction to programming with R. It then covers file management, extraction, archiving, and data cleaning with R, the use of different data formats, including CSV and JSON, and the management, analysis, and visualization of numerical data. Finally, it covers the creation and use of relational databases with

	SQL and shows applications on economic and business data.
Course Topics	- Information Systems: Data and Information, Complex Information, Complex Data and Information, interactions with databases, Database, Database to support an organization's activities, Database description, Definition of DBMS, the importance of the DBMS, Managing a phone book, Definition of database system, ANSI-SPARC Three-Level Architecture, Example of conceptual/logical schema, Example of external schema. Application data independence, External Schema, History of DBMSs: the different data models, Functionality of a DBMS, Example of Query, Transactions, Operations in transactions, Example of Transaction ACID properties of transactions, Features of a DBMS, Example of a non-redundant database. ACID properties of transactions, Features of a DBMS, Main components of a DBMS. - Examples of Information Systems: Operational Support Systems, Management of orders and purchases, Monitoring and Control Systems, Environmental monitoring systems, Video Surveillance Systems. - Information Systems in Public Administration: Document Management, Hospital Information Systems, Patient management in a hospital, Transportation Information Systems, Airport. - Introduction to R: Manuals on R, the R environment, FAQ on R, On-line resources on R, Background, Why should I use it?, Some Caveats, Installation and Start, Some useful tidbits, Packages, Installing Packages, Creating Variables, Importing Data, Plotting Data. - Preliminary Concepts about R: How R works, Creating, listing and deleting the objects in memory, the on-line help. - Data with R: Objects, Reading data in a file, Saving data, Generating data, Manipulating objects, Converting objects, Operators, Matrix computation, Matrix Computation in R, Product Row by Column. - Relational Model: Introduction, the factors of success, Relation: definition, Relation: graphic schematization, Relation, Example (Relation), Remarks, Properties of a relation, Representation of a relation, Tables and Relations, Relation Schema, Examples of Relation Schemas, Relation on a schema, Important Notation, Example. Relation on a schema, Incomplete Information, Example of Incomplete Information, Databases and Integrity Constraints, Database Schema, Relational Database, Remarks, Types of

	constraints, Intra-relational constraints, Domain constraint, Tuple constraint, Superkey, Key, Example of Superkeys and Keys, Notes, Integrity of the entity, Example relation schema with primary key. Inter-relational constraints, Example of Inter-relational constraints, Referential integrity, Concept of referential integrity, Referential integrity: syntax, Relational notation of the example, Relational Database Example, Intra-relational constraints, Choice of keys. - SQL as DDL: Data definition in SQL, in SQL, Create Table, Data Types, Constraints, Syntax, Example DB student careers, Example DB Soccer Championship, ALTER TABLE, DROP TABLE, Creating and editing schemas of relations, Changing schemas of relations - Example, CREATE SCHEMA, DROP SCHEMA, Creating a database schema – Example. - SQL as DML: Updating Rows, Deleting Rows, Queries, Syntax, Examples, Operator LIKE, NULL Values, SQL vs. Relation as a Set, Cartesian Product, Ambiguous Names, Cartesian Product - Example, Join - Example, Cartesian Product - Example, Join - Example, Variables used in the FROM, Order by, Aggregate Operators, Aggregate Operators - Examples, Queries with Grouping, Queries with Grouping - Example, Predicates on Groupes, Predicates on Groupes - Example, Set Queries, Set Queries - Example. Exercises on SQL Queries. - JSON: What is JSON, Syntax, Data Types, Usage, Examples.
Keywords	Information Systems, Data Management, R, Relational Model, SQL, JSON
Recommended Prerequisites	
Propaedeutic Courses	
Teaching Format	This course will be delivered through a combination of frontal lectures and labs.
Mandatory Attendance	Attendance is strongly recommended but not compulsory
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding Area: quantitative methods for decision-making knowledge of basic and intermediate level mathematical tools for understanding and analysing economic mechanisms through theoretical models and empirical applications knowledge of the tools for static, dynamic, and comparative analysis of data on individuals, firms and economies knowledge and understanding of descriptive statistics, the

	fundamentals of probability theory and sample methods, standard distributions and their application to economic analysis as well as linear and non-linear regression understanding of parametric estimation and hypothesis testing Knowledge of computer tools necessary for reading and analysing economic data and models knowledge of the structure of computer networks, their main applications and security techniques as well as techniques for data collection, presentation and analysis using appropriate software knowledge of international accounting systems and the double-entry method for the recognition and measurement of business operations "understanding of financial statements " "in-depth knowledge of accounting data recognition or management control " Knowledge of the analysis method for estimating present values and discount factors for estimating the cost of capital and valuation of bonds and shares Knowledge of medium and long-term financial forecasting methodologies and sensitivity analysis with simulation under uncertainty to manage risks in corporate and international finance knowledge and understanding of the international financial environment, multinational risk defence techniques and competitive strategies adopted by global banks knowledge of the mechanisms underlying effective communication of quantitative topics in three languages: Italian, German and English "Ability to apply knowledge and understanding " Area: quantitative methods for decision-making to be able to analyse (unconstrained) optimisation problems and to mathematically interpret models of social and economic dynamics to formalise economic problems using mathematical models, to solve such problems and to interpret the results conceptually being able to analyse economic data using descriptive statics, parametric and non-parametric methods as well as linear and non-linear regression and interpret the results

	knowing how to apply international accounting standards to the various contexts of business reality knowing how to derive and interpret economic information taken from the web knowing how to use computers and computer networks to analyse large quantities of data in solving complex problems and to write theses and articles knowing how to evaluate fixed-income and equity financial instruments of companies listed on stock markets through the use of spreadsheet programs knowing how to analyse financial statements by means of balance sheet ratios and communicate the results in accordance with international professional standards knowing how to apply the main theories on capital, foreign exchange and commodity markets to actually observed data, including in an international context knowing how to set up and carry out an empirical project using econometric software and financial or economic databases knowing how to use techniques for evaluating the performance of financial investments and understanding the price formation mechanisms of risky financial assets and spot and forward interest rates knowing how to work with basic and intermediate level mathematical tools, and basic level statistics, to study the behaviour of economic actors, from a theoretical and empirical point of view knowing how to analyse economic datasets using spreadsheets or other suitable software knowing how to use computer tools for the analysis of economies being able to communicate the results of quantitative analyses prepared according to international professional standards in three languages: Italian, German and English
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	The assessment will be made through a written examination, which includes questions both theoretical and inherent in solving specific problems using the different tools and techniques described during the course. Each question is assigned a maximum score; the

	student's final grade is calculated by summing the scores obtained on each question.
Evaluation Criteria	Grades are distributed as follows: - theoretical questions (60%) and practical questions (40 %).
Required Readings	Lecture slides are made available on Microsoft Teams.
Supplementary Readings	Elmasri, Navathe, “Fundamentals of Database Systems”, Pearson (in English). Atzeni, Ceri, Paraboschi, Riccardo Torlone, “Database Systems”, McGraw-Hill. Chianese, Moscato, Picariello, Sansone, “Sistemi di basi di dati ed applicazioni”, Apogeo Education-Maggioli Editore (in Italian).
Further Information	
Sustainable Development Goals (SDGs)	Quality education