MODEL D (English)	
General Information	
Academic subject	Data Visualization
Degree course	Master
Curriculum	Computer Science
ECTS credits	6
Compulsory attendance	No
Language	English

Subject teacher	Name Surname	Mail address	SSD
	Paolo Buono	paolo.buono@uniba.it	INF/01

ECTS credits details			
Basic teaching activities	Lectures		

Class schedule	
Period	
Year	
Type of class	Lecture - workshops

Time management	
Hours	150
Hours of lectures	48
Hours of personal study	102

Academic calendar	
Class begins	October 5th 2020
Class ends	January 13th 2021

Syllabus	
Prerequisites/requirements	Programming skills.
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in the Didactic Regulation and Prospectus a.y. 2020-2021)	*Knowledge and understanding* Students will acquire skills related to the fundamental principles of data visualization, the founding paradigms of this discipline, its evolutions, as well as the applications of interactive visual techniques to data to enable effective data analysis. *Applying knowledge and understanding* Students will acquire skills for the development and implementation of interactive techniques that display data of interest for analytical purposes. Guided and individual exercises will contribute to the application learned concepts. *Making informed judgements and choices* Students will gain significant autonomy of judgement and management of issues related to the design of data analysis, the use of visual techniques and data visualization tools. Group discussions will encourage the defence of one's own judgment within a working group. *Communicating knowledge and understanding* Students will be able to appropriately illustrate the characteristics of techniques, tools and methodologies specific to the field of data visualization. Presentations of the progress

	of the study will be provided, supported by slides and data visualization tools. *Capacities to continue learning* Students will demonstrate that they have developed the ability to learn and easily orient themselves in designing tools and techniques for interactive visual data analysis. At the end of each lesson, exercises will be assigned to be carried out at home and delivered within the next lesson, in order to strengthen the self-assessment of the learning of topics presented in the lesson.
Contents	Data and information visualization Definitions. Areas of application. Taxonomies. History. The role of the user. Process and life cycle. Fundamentals of information visualization. Problems The nature of the problem, tasks, users. Representations Data types. Complexity of the data. Perception and cognitive activities. Metrics. Preprocessing. Encoding the data. Encoding the relationship between data. Design support. Presentation The problem of presentation. Space constraints. Time constraints. Interaction Scenarios. Operators, operands and spaces. Continuous interaction. Step-by-step interaction. Passive Interaction. Compound interaction. Dynamic interaction. Interaction design. Visualization techniques Spatial. Geospatial. Multivariate. Trees, graphs and networks. Dynamic hypergraphs. Text and documents visualization. Comparison and evaluation of visualization techniques Tasks and user characteristics. Data characteristics. Characteristics of the displays. Structures for evaluation. Data visualization systems Systems based on data types. Systems based on the type of analysis. Text analysis in visualizations. New integrated systems. Toolkits. Research directions in Data Visualization, Information Visualization and Visual Data Analysis. Reference case studies
Course program	

Bibliography	M. Ward, G. Grinstein, D. Keim. Interactive Data Visualization. Foundations, techniques, and applications. A. K. Peters ltd. 2010. R. Spence, Information Visualization, Design for Interaction, Second Edition. Pearson Education. 2007
Notes	The textbooks are integrated with slides and teacher's handouts, available in the e-learning platform used in Course Curriculum.
Teaching methods	Class lessons and exercises to be carried out in the classroom and at home. Case studies to be developed during the course.
Assessment methods (indicate at least the type written, oral, other)	Oral exam. The student will develop a case study that will be discussed during the oral exam.
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are).	The learning assessment involves carrying out exercises during the course in order to develop problem solving strategies in the field of data visualization. The ability to choose the visual technique and interaction strategies will also be evaluated with respect to the available data and the purposes of the analysis.