MODELLO D (inglese)			
General Information			
Academic subject	Database Systems		
Degree course	Computer Science (second-level degree in Computer Science)		
Curriculum			
ECTS credits	9		
Compulsory attendance	no		
Language	English		
Subject teacher	Name Surname	Mail address	SSD
	Michelangelo Ceci	michelangelo.ceci@uniba.it	ING-INF/05
ECTS credits details			
Basic teaching activities	Basi di Dati Databases	ING-INF/05	9
Class schedule			
Period	First semester		
Year	2020/2021		
Type of class	Lectures Lab		
Time management			
Hours	86 (9 credits)		
Hours of lectures	56 (7 credits)		
Tutorials and lab	30 (2 credits)		
Academic calendar			
Class begins	05/10/2020		
Class ends	09/01/2021		
Syllabus			
Prerequisites/requirements	Databases		
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.a. 2017-2018)	*Knowledge and understanding* BD design: general and practical concepts. Conceptual and logical design. Verifying templates by standardizing. Physical organization of data and design physics. Active databases, Transaction management. Distributed architectures. Databases and WEB. Business intelligence tools. The process of knowledge discovery from databases *Applying knowledge and understanding* Conceptual, logical and physical design of a database. Designing active databases. Design of Distributed Databases. Designing databases on the web. Datawarehouse building. Using selection tools, preprocessing and transformation of data, and validation of extracted patterns. The reference DBMS is Oracle 11g *Making informed judgements and choices* Making informed judgements and choices is exhactly the		

	purpose of database design at every level: Conceptual, logical, phisical. *Communicating knowledge and understanding* Standard languages will be learned: E-R, UML . Students will be also evaluated on the basis of how much they are able to communicate design choices, at a logical, conceptual and phisical level. *Capacities to continue learning* The student will learn basic concepts that will make her/him on the position of use, understand and optimize any database on any DBMS (also distributed).
Contents	1) Methodologies and models for project definition: the life cycle of IT systems, one methodology for database design, the entity-relationship model (constructs and schema documentation). 2) Conceptual design: the collection and analysis of requirements, criteria for general representations, project strategies (top-down, bottom-up, inside-out, hybrid), the quality of a conceptual scheme, a general methodology. 3) Object-Relational databases. Data models not in the normal first form. From the relational model to objects. SQL-3: tuples and objects, type hierarchies, abstract types, queries with flattening and nesting. The manifest of third generation databases. An object-relational DBMS: Implementation of objects in Oracle: Abstract Data Types, Collections, Row Objects, object view, inheritance type, runtime type identification. Logical design in Object-Relational DBMSs. 4) BD technology. Physical organization of data, general concepts. Physical structures: sequential and hash. Physical structures: indices. B-tree. Running and optimizing queries. Execution and query optimization. Buffer Management. Buffer algorithms. Physical design. 5) Active databases. Data bases and production systems. Trigger behavior in a relational system. Definition and use of triggers in Oracle. Evolved features of active rules. Active Rule Properties (termination, confluence and determinism of observations). Design problems and implementation of active databases. Active database applications. 6) Transaction management. Transactions. Reliability control. The process of warm and cold restart. Concurrency control. View Serializability, Conflict Serializability, Two-Phase Locking, Timestamp Based Concurrency Control. Hierarchical Lock. Deadlock resolution. Transactions in SQL-3. Transactions with different levels of isolation. 7) Database Architectures: Distributed Architectures. Client-server architecture. Distributed Data Bases. Distributed Databases Technologies. Two-stage commit protocols. Parallelism. Replicated Data Bases. Federated Data Bases. 8) Data Architectures (Datawarehousing). Operational data and decision-making data. Business Intelligence Technologies. Decision Support Systems (DSS),

	Executive Information Systems (EIS) and Management Information Systems (MIS). Features of a data warehouse. Architecture of a data warehouse. The multidimensional model. Data warehouse diagram: star, snowflake, constellation. OLAP and data analysis operations: drill down and roll up. ROLAP and MOLAP. A case study: the relational model of a DW for the agri-food sector. LAB Oracle -introduction -procedures (PL/SQL) -triggers -types, types and inheritance -servlet and JSP -Oracle Warehouse builder
Course program	
Bibliography	Database systems: concepts, languages & architectures Paolo Atzeni, Stefano Ceri, Stefano Paraboschi, Riccardo Torlone ISBN: 007235387 http://dbbook.dia.uniroma3.it/ Slides presented during classes
Notes	
Teaching methods	Lectures, lab. All with the support of Slides prepared by the teacher.
Assessment methods (indicate at least the type written, oral, other)	The exam consists of a written part and a laboratory part. The written part aims at verifying the conceptual, logical and physical design capabilities of a database. In addition, it aims at verifying the acquisition of all the topics addressed during the lectures. The laboratory part is an oral discussion of a small project and aims to verify the capabilities of designing a database and using the technologies used during the laboratory. Between the parts there is no propedeuticity (i.e., they are independent each other). The mark obtained for both parts expires in May 2022. During the teaching period, two partial evaluations are planned. If successful, they substitute the written 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 student should prove to know all the concepts discussed during classes, as well as, show that he is able to design and implement a system according to the best practices discussed.
Further information	