UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica
ACADEMIC YEAR	2017/2018
BACHELOR'S DEGREE (BSC)	COMPUTER SCIENCE
SUBJECT	DATA BASES
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50166-Discipline Informatiche
CODE	01525
SCIENTIFIC SECTOR(S)	INF/01
HEAD PROFESSOR(S)	MANTACI SABRINA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	153
COURSE ACTIVITY (Hrs)	72
PROPAEDEUTICAL SUBJECTS	05880 - PROGRAMMING AND LABORATORY - INTEGRATED COURSE
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**MANTACI SABRINA** Thursday 15:00 18:00 Room 217 - second Floor. DMI - Via Archirafi 34

DOCENTE: Prof.ssa SABRINA MANTACI

PREREQUISITES	Elements of mathematical Logic. Logic Operators. The notion of mathematical relation. Basic elements of programming
LEARNING OUTCOMES	Knowledge and understanding The course aims to make the student acquire the basic tools for the design and the query of databases. In addition, the student will be given the opportunity to effectively learn and use the most commonly used DBMS. Applying knowledge and understanding The aim of the course is to give the student the ability to design and query real complex databases for data management of companies and organizations. Making judgements In the database design we want to develop the ability to choose independently the strategies to design a database effective, efficient and easy to use. Communication The aim of the course is to develop the ability to write a report and to prepare a talk on the designed database in order to communicate to the customer how the implemented database works. The student must be able to highlight the technological implications of the studied theories. Lifelong learning skill During the course the teacher will check of the ability of the student to learn through the exercises that will be conducted in class and in the laboratory class for a number of hours. At the end of the course the student will be able to read autonomously handbooks on database systems and will be ready to attend master classes on database management.
ASSESSMENT METHODS	Written exam, oral exam. Alternatively to the written exam, the students assiduously attending the lectures are given the option to design a complex project assigned and developed during the semester of the lectures. The written exam, for which the students are given 2 hours and 30 minutes of time, consists of two parts. In the first part the student is required to design a small database. The student have to produce a conceptual schema and the corresponding relational logical schema. This part of the written test is allows the teacher to verify what the student has understood about the techniques of Database design and his/her ability to apply the knowledge acquired to real applications. The second part of the written exam requires the student to use the Relational Algebra language and SQL language to query a given database. This part of the written exam aims to verify the student's ability to perform complex queries. The assignment contains 3 Relational Algebra queries and 6 SQL queries. Each of the two parts of the written exam is judjed with evaluations spanning from "Severely insufficient" to "Excellent". Students who use to attend assiduously the lectures (more than 70% of the lectures) can take part to a working group, carried on during the semester, where they are required to design and implement a complex database starting from rough committent requirements.Moreover they will also be required to write SQL queries to extract data from the designed database in order to test that it works properly. Some days before the date designated for the first exam after the end of the semester, students will have to produce a written report to be delivered to the teacher, and during the oral exam must defend their project.The students who choose this type of proof are exempt from the the written test. This kind of proof will show their ability to produce from skratch a commercial product and then to show their comprhension of the topics learned during the lectures and the ability to apply them. Moreover this will test their skills to work in a group and their ability to communicate their results to a not expert interlocutor. The project is judjed with evaluations spanning from "Severely insufficient" to "Excellent". Only the students who have gained a "sufficient" evaluation either in each part of the written test or in the project can access to the oral examination, consisting of a discussion about the written exam or the project, and a few questions (3/4 questions) regarding the course topics and it aims to evaluate the student's ability to discuss and defend their implementation choices and allows the teacher to assess his or her communication skills, essential to promote their computer product in the world of work. The treshold of sufficiency is reached if the student reach a "sufficient" in both parts of the written examination or in the group project, he or she will be able to show the knowledge of the fundamental concepts of the course, he/she will be able to expose them and argue in authonomy . Below this threshold, the

	examination is evaluated as "insufficient". The global evaluations will be proportional to the ability of the student to use the technical language, to the correct and detailed exposure of the topics and his/ her ability to apply and connect the concepts autonomously. The assessments methods are according the following evaluation table: Rating: Excellent Rating: 30 - 30 cum laude Outcome: Excellent knowledge of the topics, excellent command of language, good analytical capacity, effective ability of interaction in the teamwork, the student is able to apply knowledge to solve the proposed problems. Rating: Very good Rating: 27-29 Outcome: Good mastery of the arguments, full command of language, good ability to interact and work in groups, the student is able to apply knowledge to solve the proposed problems. Rating: Good Rating: 24-26 Outcome: Basic knowledge of the main topics, discrete command of language, discreet ability to work in groups, with limited ability to independently apply knowledge to solution of the proposed problems. Rating: Satisfactory Rating: 21-23 Outcome: It does not fully master the main topics of the teaching but possesses the knowledge, satisfactory command of language, poor ability to know how to apply it in a way self-acquired knowledge. Rating: Sufficient Rating: 18-20 Outcome: Minimum basic knowledge of the main topics of teaching and technical language, scarce or nothing ability to know how to apply knowledge autonomously acquired. Rating: Poor Outcome: Does not possess any knowledge on the main topics of the course
EDUCATIONAL OBJECTIVES	The students will learn the basics for the design and use of databases . Since this couse has a big professional fallouts, the student should be given the opportunity to design and implement autonomously a database according to the demands of the customer . He or she need also to be able to get informations fron database by any SQL query .
TEACHING METHODS	Teaching is organized in classroom and laboratory lectures, where it is expected to have a transfer of knowledge but also, with the support of computer, the contextual verification of the acquisition of the practical skills required. In order to increase students' engagement it is considered also the use of collaborative learning methodologies.
SUGGESTED BIBLIOGRAPHY	Testo principale (main textbook) Atzeni, Ceri, Paraboschi, Torlone, Basi di dati - Modelli e linguaggi di interrogazione, McGraw-Hill. Testi per consultazione (Consultation texts) Albano, Ghelli, Orsini, Fondamenti di Basi di dati, Zanichelli. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom.. Database Systems: The Complete Book.Pearson (Addison-Wesley + Prentice-Hall)

SYLLABUS

Hrs	Frontal teaching
4	The notion of database within an information system. The redundancy problems and inconsistency of data . Sharing data. DBMS . Databases versus file systems .
3	The data models . Physical, logical and external schemes. The independence of data. The languages for database query. DDL and DML.
5	The relational model. The notion of relation. Incomplete information. The null values. The integrity constraints. Keys and superkeys . Constraints of referential integrity.

SYLLABUS

Hrs	Frontal teaching
6	La Conceptual Design . The Entity -Relationship model. The constructs of the Entity -Relationship model. Entity. Relationship. Attribute. Cardinality: one-to-one, one to many, many to many . Internal and external identifier. Generalization, inheritance. Total or partial generalization. Exclusive or overlapping egneralization. Exercises. Documentation associated with the conceptual schemes. The Conceptual design . Requirements analysis. Construction of the conceptual model . Choice of Entities and Relationships. Identify generalizations. Design patterns . Project strategies. Bottom - Up , Top - Down and Inside - Out . Methodologies for creating the conceptual model . Examples
2	The Design of a Database . Methodology Project . Conceptual, logical and physical design.
6	The Logic schema. Restructuring of the conceptual model. Performance evaluation. Analysis of redundanc , elimination of generalizations , partitioning / merging of concepts ,choice of the main identifiers. Translation in the logical model . Associations many to many , one-to- many, one-to- one. Translation of complex schemes .
5	Query Languages of databases. The Relational Algebra. Relational algebra operators. The set operators. Renaming. .Projection and Selection.
5	The Join. Natural Join, Theta Join, Equi Join, Self Join, Outer join. Exercises. Equivalence between algebraic expressions . Views in relational algebra.
6	Data Manipulation Language. Simple SQL queries . Projection , selection and renaming in SQL . The "where" clause. Sortings. Aggregation functions and "group by" in SQL. Join in SQL: two syntaxes. Self Join. Boolean operators: Union , Intersection and Difference. Subquery . Group functions and groupings. Exercises on sql query
6	The SQL query language. The data definition language. Creating tables. Attributes, domains and default values . Integrity constraints. Primary Key, Unique, not null. Foreign key. The"check" constraint. Deleting tables and modifying tables . Indices .
6	Exercises for conceptual and logic design of a real Data Base
6	Implementation of a database and on a commercial DBMS (Oracle or MySQL)
6	Database queries on a database made by a DBMS
6	Normalization. Anomalies. The notion of functional dependence. Anomalies arising from the presence of functional dependence. The Boyce and Codd Normal Form. Decomposition without loss . Dependency preservation. Third normal form . Decomposition into third normal form. The dependency theory. Functional closure of a set of attributes. Algorithm for computing the functional closure. Sets of equivalent functional dependencies. Non-redundant and reduced sets of functional dependencies. Transformation of a system of functional dependencies into a non-redundant and reduced one. Algorithm for decomposition into third normal form.