ACADEMIC PROGRAM

DATA BASE

B.F.A. IN **COMPUTER SCIENCE**

MODALITY: ON CAMPUS

ACADEMIC YEAR: 2022-2023

Name of the course:	Data Base
Degree :	Computer Science
Location:	Centro Universitario de Tecnología y Arte Digital
Area:	Fundamentals of Computer Science
Year:	2º
Teaching period:	2
Type:	B
ECTS credits:	6
Teaching modality:	On campus
Language:	English
Lecturer / Email	-
Web page:	http://www.u-tad.com/

SUBJECT DESCRIPTION

Area description

This course belongs to the subject “Fundamentals of Computer Science”, where thestudent acquires basic knowledge of the principles that underpin software engineering

Subject description

In this subject, the general concepts of the relational model and relational algebra are studied as theoretical foundations of relational databases and the SQL language. The learning of SQL as a standard management language for the administration of information in relational databases is deepened, applying it in a practical way through the management of MySQL and MariaDB database management systems. The necessary knowledge is taught for the administration and design of relational databases, addressing their optimization and normalization. The different interfaces for accessing relational databases from different programming languages such as Python and PHP are analyzed. Advanced concepts of relational databases are introduced, in addition to analyzing aspects of NoSQL databases such as MongoDB. The foundations of this subject are developed from both a theoretical and practical point of view.

The importance and interest of this subject for the student lies, among other considerations, in the fact that learning databases is essential for any profession related to technology where the value of information is

increasingly greater and more important, due to the computerization of any existing process in any field, discipline, business or organization.

COMPETENCIES AND LEARNING OUTCOMES

Competencies

BASIC AND GENERAL SKILLS

BC1: Students should demonstrate knowledge in an area of study that builds upon the foundation of general secondary education and goest beyond at a level that, while supported by advanced textbooks, also encompasses certain aspects derived from the cutting edge of their field of study.

BC2: Students should be able to apply their knowledge to their work or vocation in a professional manner, and they should possess the competencies typically demonstrated through the development and defence of arguments as well as problem-solving within their field of study.

BC3: Students must possess the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that involve reflection on socially, scientifically, or ethically significant issues.

BC4: Students should be capable of conveying information, ideas, problems, and solutions to both specialized and non-specialized audiences.

BC5: Students should have developed the learning skills necessary to pursue further studies with a high degree of autonomy.

CG1 - Ability to understand, plan and solve problems through the development of computing solutions.

GC3 - Knowledge of the scientific fundamentals applicable to the resolution of computing problems.

GC5 - Management of human and technological resources for the correct realization of computer science projects

GC9 - Ability to learn, modify and produce new computer technologies.

SPECIFIC COMPETENCES

CE3 - Knowledge of the relational algebra and the performance of queries in procedural languages for the design of standardized database schemas based on

database schemas based on entity-relational models.

CE9 - Knowledge of control structures, variables, programming syntax and memory usage management in an effective way in the development of a computer application.

in the development of a software application

CE11 - Knowledge of the architecture of the Operating Systems as well as the different mechanisms for the management of processes,

communication and synchronization of processes

CE13 - Knowledge of the fundamentals of computer networks, the different topologies and their communication protocols.

communication protocols

CE16 - Knowledge of the operation of computer systems.

Learning outcomes

Upon completion of the degree, the graduate will be able to:

- To understand the life cycle of an application using different programming languages
- To know how to debug a software application.
- To know and use markup languages (HTML)
- To build web pages using style sheets (CSS)
- To use the control version tool Git in collaborative development
- To know the fundamentals of Boolean Algebra
- To be able to handle logic gates and simple sequential circuits
- To handle the binary representation of different data types
- To understand von Neumann¿s model
- To understand the hardware architecture of a computer.
- To be able to coda basic programs in assembly language
- To know common network technologies (WiFi, BlueTooth, Ethernet¿)
- To know network topologies
- To understand computer communication using protocols such as ARP, IP, TCP, etc.
- To be able to set basic routing configurations.
- To be able to develop simple network applications
- To know the basic architecture of an Operating System
- To understand the principles of process scheduling
- To understand how the hierarchy of memory works
- To be able to develop a simple file system
- To be able to develop a toy driver
- To understand processes/threads communications and synchronization mechanisms

CONTENTS

Organization: serial, sequential, indexed

Multiple key access

Relational algebra

The relational model

Database design and schemas

SQL

SUBJECT SYLLABUS

Topic 1: Introduction to Databases.

- Relational Databases.
- Database Management System.
- Relational Database Architecture.
- DB models.
- Non-relational databases (NoSQL).
- Databases in the Market.
- Installation of the Work Environment.

Topic 2: Relational Model and Relational Algebra.

- Codd's rules.
- Relational Model Structure.
- Schema and Attributes of the Relational Model.
- Keys: Primary vs. Foreigners.
- DB Design Phases.
- Normalization.
- Operations of Relational Algebra.

Topic 3: SQL Language and Advanced SQL.

- SQL language: DDL, DML, DCL and TCL
- Creation/Updating of tables.
- Consultations.
- Data update operations.
- Transactional and blocking commands.
- Views. Types of Views.
- Graphical Environments with SQL.

Topic 4: Access to MySQL. Storage. Indexed.

- Forms of access to BBDD.
- Console Access.
- Interaction through Scripts.
- Interaction through Programming Language: Python and PHP.
- Types of Storage.
- Hierarchies.
- Indexed.

Topic 5: Database Administration in MySQL.

- SQL language: DCL and DDL.
- Users and Privileges.
- Basic MySQL operations
- Backups.
- Backup Restoration.
- Graphic Management Tools.
- Optimization/Tuning.

Topic 6: Advanced Aspects of Relational Databases and Introduction to Non-Relational Databases: MongoDB.

- Procedural Languages for BBDD.
- Stored Procedures (procedures, functions, triggers, events).
- SQL injection.
- Introduction to Non-relational Databases: General concepts of Non-relational Databases.
- NoSQL database classification.
- MongoDB. Main Features.
- MongoDB installation.
- MongoDB elements.
- Operations with Documents.
- Indexes on MongoDB.

TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence
Theoretical / Expository classes	32,00	32,00
Practical classes	22,00	22,00
Tutorials	4,00	2,00
Independent study and autonomous work of the student	50,00	0,00
Elaboration of work (group or individual)	36,00	0,00
Evaluation Activities	6,00	6,00
TOTAL	150	62

Teaching methodologies

Expository method or master lesson

Case learning

Learning based on problem solving

Cooperative or collaborative learning

inquiry learning

Flipped classroom methodology

Gamification

Just in time Teaching (JITT) or classroom on time

Expository method or master lesson

Case method

Learning based on problem solving

Cooperative or collaborative learning

inquiry learning

Flipped classroom methodology

Gamification

TEMPORAL DEVELOPMENT

DIDACTIC UNITS / TOPICS TIME PERIOD

Topic 1: Introduction to Databases. Week 1

Topic 2: Relational Model and Relational Algebra. Weeks 2 and 3

Topic 3: SQL Language and Advanced SQL. Weeks 4, 5 and 6

Topic 4: Access to MySQL. Storage. Indexed. Weeks 7, 8 and 9

Topic 5: Database Administration in MySQL. Weeks 10, 11 and 12

Topic 6: Advanced Aspects of Relational Databases and Introduction to Non-Relational Databases: MongoDB. Weeks 14 and 15

EVALUATION SYSTEM

ASSESSMENT SYSTEM	MINIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)	MAXIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)
Assessment of participation in class, exercises or projects of the course	0	30
Assessment of assignments, projects, reports, memos	30	80
Objective test	10	60

GRADING CRITERIA

ASSESSMENT SYSTEM	ORDINARY EVALUATION	EXTRAORDINARY EVALUATION
Assessment of participation in class, exercises or projects of the course	0	0
Assessment of assignments, projects, reports, memos	70	70
Objective test	30	30

General comments on the evaluations/assessments

It will be valued that the student correctly applies the content learned during the theoretical classes along with the correct completion of a report both in the practices (SE2) and in the exam (SE3).

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The average grade (NM) of the subject will be calculated considering the grades of activities AC1, AC2 and AC3, applying the corresponding weights (which have been set within the margins indicated in the previous table). Therefore, the rule to apply to calculate the average grade for the subject will be:

Average Grade (NM) = 30%*AC1 + 40%*AC2 + 30%*AC3

Ordinary Evaluation

• To pass in the ordinary session, the student must have an average grade (NM) equal to or greater than 5.00.

• In order for this average to be taken, the student must have at least a 5.00 in each of the practices (AC1 and AC2) and a 5.00 in the Exam (AC3).

• Likewise, it will be necessary to have made the requested deliveries during the course on the date established by the teacher.

Students who fail to pass the ordinary evaluation will have the opportunity to do an extraordinary evaluation.

Extraordinary Evaluation

In the Extraordinary call, the student will have the option of taking the remaining parts of the ordinary call. The subjects (theory or practices) that have been passed in the ordinary call are saved for the extraordinary call.

In this case, the evaluation criteria will be the same as in the ordinary call.

LIST OF REFERENCES (BOOKS, PUBLICATIONS, WEBSITES):

Basic:

• Database System Concepts, 7th Edition. Avi Silberschatz, Henry F. Korth and S. Sudarshan. McGraw-Hill, 2020. ISBN 9780078022159

Recommended:

• Data Management, Databases and Organizations, 6th Edition. Richard T. Watson. Prospect Press, 2020. ISBN 9781943153039

REQUIRED MATERIALS, SOFTWARE AND TOOLS

Type of classroom
Theory classroom

Board and projection system

Materials:

Personal computer with Windows and Linux (via Virtualbox)

Software:

DBMS: MySQL y MariaDB