ACADEMIC PROGRAM

DATA ENGINEERING PROJECTS

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

MODALITY: ON CAMPUS

ACADEMIC YEAR: 2023-2024

Name of the course:	data Engineering Projects
Degree :	Computer Science
Location:	Centro Universitario de Tecnología y Arte Digital
Area:	Data Engineering
Year:	4º
Teaching period:	Anual
Type:	OBM
ECTS credits:	9
Teaching modality:	On campus
Language:	English
Lecturer / Email	-
Web page:	http://www.u-tad.com/

SUBJECT DESCRIPTION

Area description

The contents of the subject allow students to understand the flow of searching, ingesting, storing, processing and analyzing data information and brings students closer to the techniques and technologies necessary for managing large amounts of data.

Subject description

The subject Data Engineering Projects is aimed at the development of real projects in the field of Data Engineering. It will allow the student to strengthen and reinforce the skills acquired in the rest of the subjects and develop skills in research, planning, team and professional work, software development, documentation, auditing and public presentation in the context of Data Engineering.

In order not to restrict the acquisition/application of knowledge to a particular area of Data Engineering, the student will not only have to develop a specific project but will also have to participate in the audit of projects assigned to other students/teams. . This will allow the student to put into practice and consolidate the knowledge acquired in the different subjects of the Data Engineering major.

The subject is also aimed at promoting the subsequent integration of the student into the world of work since in it the student participates in the development of projects from their definition to their subsequent implementation, which is a requirement and common practice in this sector for the hiring of professionals.

COMPETENCIES AND LEARNING OUTCOMES

Competencies

BASIC AND GENERAL SKILLS

CG1 - Ability to understand, schedule and solve problems trough software development

CG3 - Knowledge of the scientific fundamentals applicable to the resolution of computer problems

CG4 - Ability to simplify and optimize computer systems by understanding their complexity

CG9 - Ability to learn, modify and develop new software solutions

CG10 -Use of creative techniques to carry out computer projects

CG11 - Ability to search, analyze and manage information for insights capture

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.

TRANSVERSAL SKILLS

CT1 - Knowledge of the definition, scope and implementation of the fundamentals of project management methodologies for technology projects

CT2 - Knowledge of the main sectorial players and the life cycle of a digital content development and commercialization project

CT4 -Ability to update the knowledge acquired in the management of digital tools and technologies according to the current state of affairs of the sector and the technological solution

CT5 -Development of the basic skills for digital entrepreneurship.

SPECIFIC SKILLS

CE3 - Knowledge of relational algebra and querying in procedural languages for the design of standardized database schemas based on entity-relationship models

CE10 - Ability to work with a release manager and generate application documentation automatically.

Learning outcomes

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

- To know and develop storage procedures and data management in distributed environments.

- To know and apply supervised, unsupervised and semisupervised learning techniques.

- To know and apply Deep Learning techniques

- To be able to retrieve information using web scraping or standard APIs

- To know and understand Natural Language Processing techniques

- To be able to analyze social networks contents.

- To understand the nature and representation of digital images.

- To know the applications of neural networks to the analysis and generation of sound, static images and video.

- To develop software solutions for computer vision.

- To develop a fully-fledged data project applying iterative methodology from design to delivery.

CONTENTS

Data Engineering Projects

Design, implementation and delivery of data applications

SUBJECT SYLLABUS

Design, implementation and commissioning of a data-driven service or application, preferably using large amounts of data or heterogeneous sources.

Since the subject is oriented towards the development of projects, the specific contents included in the projects may vary depending on the academic year. In general terms, the projects will be aimed at developing solutions that address:

- Design, implementation and management of distributed systems.

- Data analysis, management and visualization

- Data mining and machine learning.

- Team work and software development methodologies.

- Monitoring and control of the software life cycle

TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence

Theoretical / Expository classes	44,06	44,06
Practical classes	34,88	34,88
Tutorials	6,00	3,00
Independent study and autonomous work of the student	75,00	0,00
Elaboration of work (group or individual)	47,81	0,00
Evaluation Activities	7,88	7,88
Project Follow-Up	9,38	9,38
TOTAL	225	99,2

Teaching methodologies

Expository method or master lesson

Case learning

Learning based on problem solving

Project based learning

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

Project based learning

Cooperative or collaborative learning

inquiry learning

Flipped classroom methodology

Gamification

TEMPORAL DEVELOPMENT

DIDACTIC UNITS / TOPICS TIME PERIOD

Presentation and definition of projects: Getting in touch with the solutions and technologies investigated. 20 teaching hours

(It may vary depending on the number of technologies investigated)

Choosing projects and creating teams 2 teaching hours

Project development and audit. 56 teaching hours

Presentation and final evaluation of projects 12 teaching hours

(It may vary depending on the number of projects developed)

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	10	30
Assessment of assignments, projects, reports, memos	40	80
Objective test	10	60

GRADING CRITERIA

ASSESSMENT SYSTEM	ORDINARY EVALUATION	EXTRAORDINARY EVALUATION
Assessment of participation in class, exercises or projects of the course	10	10
Assessment of assignments, projects, reports, memos	80	80
Objective test	10	10

General comments on the evaluations/assessments

Ordinary Call

Attendance and participation in class SE1 Evaluation of participation in class, in practices or in projects of the subject 10%

Initial proposal and search for technologies SE2 Evaluation of works, projects, reports, reports 10%

Research and presentation of technology SE2 Evaluation of works, projects, reports, reports 10%

Audits (3 in total) SE2 Evaluation of works, projects, reports, reports 15% each audit (5% presentation, 5% code, 5% audit report)

Final presentation SE2 Evaluation of works, projects, reports, reports 15% (5% presentation, 10% final code)

Individual evaluation SE3 Objective Test 10%

• Throughout the course, activities and projects will be proposed that must be delivered before the indicated date through the virtual platform. Among the proposed activities and projects include:

• Research projects.

• Intermediate and final deliverables of the project under development.

• Evaluation/audit reports on the status/result of other students' projects.

• Students will have to make presentations/defenses associated with the proposed activities and projects that will allow the teacher to evaluate the students individually and objectively.

• To pass the subject it is essential that the final grade is at least 5.0 (out of 10). In addition to this requirement, it is necessary that the objective test grade be at least 5.0 (out of 10). If any of these requirements are not met, the subject will be automatically considered failed regardless of the rest of the grades.

Extraordinary call:

• If the student does not obtain approval in the ordinary session, the student may appear in the extraordinary session with a new development agreed upon and defending them individually before the teacher.

Attendance and participation in class SE1 Evaluation of participation in class, in practices or in projects of the subject 10%

Initial proposal and search for technologies SE2 Evaluation of works, projects, reports, reports 10%

Research and presentation of technology SE2 Evaluation of works, projects, reports, reports 10%

Extraordinary presentation SE2 Evaluation of works, projects, reports, reports 60% (20% presentation, 40% final code)

Individual evaluation SE3 Objective Test 10%

• If it is the case that there is more than one student from the same team who has to present the same activities or projects, they may collaborate in the development of said activities. To do this, they must first consult the teacher about the specific roles assigned to each of them.

• No grades of any kind will be kept between different academic years.

Copy:

• Any suspicion of copying or use of code obtained on the Internet will invalidate the delivery and will lead to the assignment of a fail in said call and the following one to all the students involved.

Other considerations:

• The use of mobile phones in the classroom is not allowed during the continuous evaluation period, unless expressly indicated otherwise by the teacher. Laptops may only be used for activities related to the subject. The teacher may withdraw the right to use the computer from those students who use it for activities that are not related to the subject (checking emails, news or social networks, consulting or preparing activities for other subjects, etc.).

• It is not allowed to consume drinks or food in the classroom. The presence of any type of drink on the tables is also not permitted, even in closed containers.

• The student will be required to participate actively, necessary for the development of the classes.

• The student will be required to behave well at all times during classes. Bad behavior that prevents the normal development of the class may lead to expulsion from the classroom for a period of time to be determined by the teacher.

LIST OF REFERENCES (BOOKS, PUBLICATIONS, WEBSITES):

The bibliography for this subject will be that of the subjects of the mention in data engineering.

At the same time, students will generate their own bibliography from the search and investigation of new technologies and solutions necessary for the development of the proposed projects.

To complete the bibliography obtained by the students, the teacher will incorporate bibliography throughout the course as the students advance in the syllabus and have already carried out the research process.

REQUIRED MATERIALS, SOFTWARE AND TOOLS

Type of classroom
Theory classroom

Board and projection system

Materials:
Personal computer with Linux OS and/or virtualization capability (Oracle VM and Docker)

Software:
Python 3.X