



## **ACADEMIC PROGRAM**

# **PROJECTS II: TRENDS IN SOFTWARE ENGINEERING**

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

***MODALITY: ON CAMPUS***

***ACADEMIC YEAR: 2023-2024***

<b>Name of the course:</b>	<b>Projects II: Trends in Software Engineering</b>
Degree :	Computer Science
Location:	Centro Universitario de Tecnología y Arte Digital
Area:	Projects
Year:	2º
Teaching period:	Anual
Type:	OB
ECTS credits:	6
Teaching modality:	On campus
Language:	English
Lecturer / Email	-
Web page:	<a href="http://www.u-tad.com/">http://www.u-tad.com/</a>

## SUBJECT DESCRIPTION

### Area description

The projects subject is a tool that will enable the student to strengthen and reinforce the skills acquired in the rest of the subjects of the degree, as well as develop teamwork skills and the acquisition of professional work dynamics. It will also allow essential interdisciplinary work for the insertion and development of any digital profession.

### Subject description

This subject serves to obtain knowledge, from a practical point of view, of the three mentions of the degree. In this way the student will be able to choose the most appropriate mention for their needs.

## COMPETENCIES AND LEARNING OUTCOMES

### Competencies

#### BASIC AND GENERAL COMPETENCIES

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

CG2 - To develop software that are environmental friendly, engaged with society and natural resources and law and ethics compliant

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

CG5 - Management of human and technological resources for the proper delivery of computer projects

CG6 - Develop collaborative projects showing teamwork skills, versatility, flexibility, creativity and respect for the work of the team members

CG7 - Knowledge of the creative foundations of ideation in software development projects.

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

CG12 - Ability of decision-making during development of a digital project, based on the analysis of its context and in accordance with its target audience and business model

CG13 -Development of the critical spirit in social and communication spheres to properly behave in the knowledge and information society

BC1: Students should demonstrate knowledge in an area of study that builds upon the foundation of general secondary education and goes 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.

#### TRANVERSALES COMPETENCIES

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

#### SPECIFIC COMPETENCIES

CE5 - Ability to design and deploy client-side and server-side web applications with scalable standard technologies

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

CE19 - Ability to conceive, design through graphic languages and implement a computer application using different development methodologies, from the conception of the product to its final development to the definition of its phases and iterations

CE20 - Ability to test the operation and functionality of a computer application, develop test plans and use test-oriented design and programming techniques

CE21 -Ability to assess the quality of a computer application by applying software quality measurement metrics, procedures, and standards

CE22 - Knowledge of the techniques and implications of maintaining computer applications including those that use reverse engineering principles to understand and modify software of unknown structure

CE26 - Knowledge of human-machine interaction fundamentals and the role that this interaction plays in the development of digital projects.

CE27 - Knowledge of methods and techniques related to the conceptualization, design, analysis and evaluation of usable and accessible interactive products

### **Learning outcomes**

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

- To learn the Arduino microcontroller programming language
- To build electronic prototypes Arduino-controlled
- To develop a digital system built with microcontrollers
- To develop an interactive application using a graphic engine
- To understand the processes of security analysis and apply them in a simple scenario
- To know the value of data and build an iterative data-driven application

To develop a functional full stack application

## **CONTENTS**

Each student will complete 3 small projects on the following walks:

Data Engineering. The data value chain.

Cibersecurity: Security análisis of simple networks, sistemas and applications.

Graphics computing, Immersive Systems and Videogames. Design o fan

## **SUBJECT SYLLABUS**

Software engineering trends:

Three small projects will be carried out, one in each of the following lines:

- Data Engineering
- Cybersecurity

- Graphic Programming, Immersive Systems and Video Games

## TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

### TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence
<i>Theoretical / Expository classes</i>	10,00	10,00
<i>Practical classes</i>	20,00	20,00
<i>Tutorials</i>	4,00	2,00
<i>Independent study and autonomous work of the student</i>	18,57	0,00
<i>Elaboration of work (group or individual)</i>	64,29	0,00
<i>Evaluation Activities</i>	8,57	8,57
<i>Project Follow-Up</i>	24,57	24,57
<b>TOTAL</b>	150	65,14

### 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

Data engineering 10 weeks

Cybersecurity 10 weeks

Graphic programming, immersive systems and video games 10 weeks"

## EVALUATION SYSTEM

ASSESSMENT SYSTEM	MINIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)	MAXIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)
<i>Assessment of participation in class, exercises or projects of the course</i>	20	40
<i>Assessment of assignments, projects, reports, memos</i>	40	70
<i>Objective test</i>	10	40

## GRADING CRITERIA

ASSESSMENT SYSTEM	ORDINARY EVALUATION	EXTRAORDINARY EVALUATION
<i>Assessment of participation in class, exercises or projects of the course</i>	10	10
<i>Assessment of assignments, projects, reports, memos</i>	70	70
<i>Objective test</i>	20	20

General comments on the evaluations/assessments

- The grade for each of the units will be divided equally between the three blocks of the subject (data engineering, graphic programming and cybersecurity).
- The subject is oriented to the practical development of projects from which the student will be evaluated taking into account the work done in class and the final result.
- Each teacher will determine the particular evaluation criteria at the beginning of their teaching unit.
- The objective test will be associated with the in-person defense of the class projects and an activity on the blackboard that includes a summary of the work.
- Any suspicion of copying or use of code obtained on the Internet will invalidate the delivery and will result in the assignment of a fail in said call and the following one to all the students involved.
- In order to successfully pass the subject, it will be necessary for the student to pass each teaching unit separately. An average will not be taken if any of the teaching units are failed and the final grade will be 4 out of 10 even if the average is higher than 5.
- If the student does not obtain approval in the ordinary call, the student must re-sit the failed parts, maintaining the same evaluation criteria for the extraordinary call.
- 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.
- Active participation will be required from the student, 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):**

Basic Bibliography:

Data Engineering:

Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. O'Reilly Media.

Zaharia, M., Xin, R. S., Wendell, P., Das, T., Armbrust, M., Dave, A., ... & Ghodsi, A. (2016). Apache spark: a unified engine for big data processing. Communications of the ACM, 59(11), 56-65.

Meng, X., Bradley, J., Yavuz, B., Sparks, E., Venkataraman, S., Liu, D., ... & Xin, D. (2016). Mllib: Machine learning in apache spark. The Journal of Machine Learning Research, 17(1), 1235-1241.

Cybersecurity:

Hacking Exposed 6: Network Security Secrets Solutions, Publisher: McGraw-Hill The Web Application Hacker's Handbook (Second Edition), Publisher: Wiley

Recommended Bibliography:

Data Engineering:

Apache Spark, accessed 09/18/2020. <https://spark.apache.org/>

Apache Spark MLlib, accessed 09/18/2020. <https://spark.apache.org/mllib/>

Cybersecurity:

Mastering Kali Linux for Advanced Penetration Testing, Publisher: Wiley

## **REQUIRED MATERIALS, SOFTWARE AND TOOLS**

### **Type of classroom**

Theory classroom

Board and projection system

### **Materials:**

Personal Computer with Windows 10 or macOS 10.14 or higher

### **Software:**

Proyecto de Ingeniería de Datos:

- Navegador web compatible con Google Colab

Proyecto de Programación Gráfica:

- Unity 2020.1

Proyecto de Ciberseguridad:

- VirtualBox y máquina virtual de Kali Linux