

# Teaching guide

## IDENTIFICATION DETAILS

Academic year:	2024-2025		
Degree:	Computer Engineering		
Field of Knowledge:	Engineering and Architecture		
Faculty/School:	Higher Polytechnic School		
Course:	FUNDAMENTALS OF COMPUTER ENGINEERING		
Type:	Basic Training	ECTS credits:	6
Year:	1	Code:	5614
Teaching period:	First semester		
Area:	IT		
Module:	Basic training		
Teaching type:	Classroom-based		
Language:	English		
Total number of student study hours:	150		

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## SUBJECT DESCRIPTION

"Fundamentals of Computer Engineering" aims to provide a global vision of Computer Engineering in both academic and professional points of view. The course gives the students a grasp of the fundamentals on which

this engineering is based (mathematics, physics, anthropology and ethics), the future professional careers and the role of a computer engineer in today's society.

The course is divided in two parts. the first part addresses the theoretical foundations, while the second helps develop practical skills.

The first part covers three fundamental blocks of content.

1) Computer Engineering in Society: Background and historical perspective: past, present and future of Computer Engineering. Computer Engineering as an academic discipline or profession. The human factor: anthropological and ethical foundations.

2) Information and Data: Information representation. Organization of information.

3) Information Processing, Management and Transmission: Fundamentals, current paradigms and trends in computer systems and applications.

The second part of the course is devoted to the development of practical skills where an introduction to web development is addressed, through the realization of a project for the creation of a web page on contents related to the course.

Besides providing the basics of a computer engineer technical skills, this course contributes to the development basic soft-skills for an engineer, such as teamwork, ethical commitment and communication skills, both oral and written, of technical information, favouring the comprehensive training of the engineer as stated in the educational project of the University.

## GOAL

The specific objectives of this course are designed to equip students with a comprehensive understanding of the field of Computer Engineering:

- Grasp the essential objectives of Computer Engineering, its ultimate goals, and the value it brings to society, while contemplating the role you aspire to play as an engineer in the future.
- Gain knowledge of the fundamental principles upon which technological progress should be based, with an initial historical perspective on technological development.
- Recognize the importance of the human element in professional practice and cultivate a commitment to service and contributing to the common good.
- Achieve a global vision of the field, understand its various areas of knowledge, and identify different career paths and professional profiles to begin questioning your own vocational calling.
- Acquire knowledge about current paradigms, trends in computing, data management, and an introduction to web development.

## PRIOR KNOWLEDGE

Admission requirements for the Degree program.

## COURSE SYLLABUS

### Module I: Theoretical Foundations

#### Block 1. Computer Engineering in Society.

- Historical background and perspectives.
- Definitions and basic concepts.
- Past, present, and future of ICT (Information and Communication Technology).
- Computer Engineering as an academic discipline and profession.

#### Block 2. Current paradigms and trends in systems and applications.

- Software development: more than just programming.
- Structure of computer systems: Hardware, Software, Operating Systems and Networks.
- New paradigms and trends: Cloud computing, Quantum computing, Artificial Intelligence, Blockchain, Robotics, Smart cities, IoT (Internet of Things).

#### Block 3. Information and Data.

- Information and Data: number systems, representation of numeric and alphanumeric information (codes).
- Data Foundations: Big Data, Data models, Data protection, Laws and ethics.

### Module II: Practical skills - Introduction to Software Development

#### Block 1. Introduction to Software Development and Management

- Basic concepts.
- Repositories: Git & Github.
- Integrated Development Environments (IDEs)

#### Block 2. Creation of HTML5 web pages.

- Basic concepts.
- The Document Object Model.
- Forms and containers.

#### Block 3. Design and layout with CSS3.

- Basic concepts.
- CSS elements.
- Box and float models.
- Element positioning.

## EDUCATION ACTIVITIES

The methodology followed in this course aims to facilitate student learning of the fundamental concepts and techniques of the subject. It combines Face-to-face sessions (theoretical and practical) to encourage student participation and foster interaction between students and between students and teachers, promoting collaborative learning and self-learning abilities through problem-solving strategies and intervention methodologies.

Face-to-face sessions will be complemented by a significant amount of independent work by students, often carried out in groups, to promote collaborative and cooperative learning.

Non-face-to-face activities, which can be individual or collective, will be supervised by the teacher during sessions and practical works (individual or group), aimed at fostering autonomous and collaborative learning. These non-face-to-face activities include individual study and work, which will help reinforce the concepts covered in lectures and the application of those concepts in practical classes.

In some cases, students will be required to present the main findings of their study or work in class, facilitating knowledge and experience exchange among students, promoting effective communication skills and synthesis abilities.

An online learning platform called the Canvas will be used to facilitate access to materials, work planning, as well as communication with the professor and other students. This platform offers different electronic resources to complement students learning.

## DISTRIBUTION OF WORK TIME

CLASSROOM-BASED ACTIVITY	INDEPENDENT STUDY/OUT-OF-CLASSROOM ACTIVITY
68 hours	82 hours
<ul style="list-style-type: none"> <li>• Theoretical sessions 16h</li> <li>• Practical sessions 16h</li> <li>• Labs 16h</li> <li>• Tutorials 5h</li> <li>• Evaluation 3h</li> <li>• Workshops 6h</li> <li>• Oral presentation of assignments 6h</li> </ul>	<ul style="list-style-type: none"> <li>• Independent study and individual works 34h</li> <li>• Teamwork 48h</li> </ul>

## SKILLS

### Basic Skills

Students must have demonstrated knowledge and understanding in an area of study that is founded on general secondary education. Moreover, the area of study is typically at a level that includes certain aspects implying knowledge at the forefront of its field of study, albeit supported by advanced textbooks

Students must be able to apply their knowledge to their work or vocation in a professional manner and possess skills that can typically be demonstrated by coming up with and sustaining arguments and solving problems within their field of study

Students must have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that include reflections on pertinent social, scientific or ethical issues

Students must be able to convey information, ideas, problems and solutions to both an expert and non-expert audience

Students must have developed the learning skills needed to undertake further study with a high degree of independence

### General Skills

Capacity for conceiving, developing and maintaining computer systems, services and applications using engineering methods in software as an instrument of quality control, in accordance with the knowledge acquired according to section 5 of this report.

Knowledge of basic materials and technologies, which provide skills for the learning and development of new methods and technologies, as well as those which provide strong versatility for being adapted to new situations.

### **Specific skills**

Basic knowledge about the use and programming of computers, operative systems, databases and computer programmes applied to engineering.

Knowledge of the structure, organisation, function and interconnectivity of computer systems, programming basics, and their application for solving problems in engineering.

## **LEARNING RESULTS**

Recognize and use, in an explanation or discourse, the terminology, both hardware and software, involved in the creation, management and exploitation of a computer system, related to any field of knowledge of computer engineering.

Relate and relate key historical facts and events in the emergence and evolution of computers and computer science, as well as to explain and analyze future trends.

Explain the fundamentals and apply the different mechanisms for representing and organizing both numerical and non-numerical information within a computer system.

Explain the basic aspects of the fundamental areas of Computer Engineering: hardware, software and networks.

Create a web system for information dissemination.

Research and adequately present, both orally and in writing, a computer project

## **LEARNING APPRAISAL SYSTEM**

### **ORDINARY CALL**

The evaluation of student performance will take into account the following aspects:

- [1] Theoretical/Practical exams: accounts for 50% of the final grade. Different tests or written assessments on the subject content will be conducted.
- [2] Practical works: accounts for 40% of the final grade.  
A group project focused on a research topic related to the topics covered during Part I. An individual web project related to the topics covered during Part II.
- [3] Class participation and engagement: accounts for 10% of the final grade. It is mandatory to have attended at least 80% of the sessions; otherwise, this assessment will receive a score of 0. The interest shown by the

student will be evaluated, taking into account the completion of exercises proposed in class, attendance to individual or group tutorials, active participation in class by answering the professor's questions, study of advanced topics not covered in class, collection of news related to the subject from media sources, etc.

Exams [1] will be conducted without the use of slides, code snippets, notes, books, or any other materials related to the subject.

**A minimum score of 5 out of 10 is required in items [1] and [2] to pass the course.**

### **EXTRAORDINARY CALL**

The evaluation of student performance will take into account the following aspects:

- **The evaluation scheme is identical to that used for the ordinary call.**
- Students who have not achieved the minimum grade in the exam and/or any of the items, therefore failing in the ordinary call, may have the opportunity to recover their grades in the extraordinary call.
- Students will only sit for the items they have scored below 5.
- Class participation item is non-recoverable.

Exams [1] will be conducted without the use of slides, code snippets, notes, books, or any other materials related to the subject.

**A minimum score of 5 out of 10 is required in items [1] and [2] to pass the course.**

### **ACADEMIC EXEMPTIONS**

If a student is exempt from attending class, either due to a second enrollment in the subject or subsequent enrollments, or by explicit authorization from the Degree Director, they will be evaluated through the same type of assessments.

The 10% for class participation can be obtained by attending at least three tutorials with the teacher in charge of the course.

### **EXAM ATTEMPTS**

For the purposes of counting exam attempts in a course, an attempt will only be considered used if the student has participated in all the assessment tests, or in a portion of them, provided that their contribution to the final grade exceeds 50%, even if the student does not appear for the final exam.

- A student will be considered to have attempted a test if they start it, even if they do not complete it.
- An exam attempt will be counted as utilized if the student appears for the final exam or if any part of the assessment passed is carried over to a make-up exam session.

The status of **Unattended** in a make-up exam session will apply only if the student does not attend or submit any pending exams, practical works, or assignments.

### **PLAGIARISM**

Any form of fraud or plagiarism by a student in an evaluative activity will be penalized according to the UFV's Code of Conduct. Plagiarism includes any attempt to deceive the evaluation system, such as copying exercises, exams, practices, assignments, or any other type of submission, either from another student or unauthorized materials or devices, with the intention of making the professor believe they are the student's own work.

## **BIBLIOGRAPHY AND OTHER RESOURCES**

### **Basic**

Ferdinando Satacroce Git Essentials: Create, Merge, and Distribute Code with Git is an excellent primer for any Git beginner 2nd Revised edition

Juan Martínez-Barea El mundo que viene: descubre por qué las próximas décadas serán las más apasionantes de la historia de la humanidad 4th edition

Mariot Tsitoara Beginning Git and GitHub 1st edition  
Apress

Jon Duckett HTML and CSS: Design and Build Websites 1st edition

Jesse James Garrett The Elements of User Experience: User-Centered Design for the Web and Beyond 2nd edition

## **Additional**

Bill Thompson Tu página web 1st edition

Jakob Nielsen Designing Web Usability: The Practice of Simplicity 1st edition