Teaching guide

IDENTIFICATION DETAILS

Degree:	Computer Engineering
Scope	Computer and Systems Engineering
Faculty/School:	Higher Polytechnic School
Course:	FUNDAMENTALS OF COMPUTER ENGINEERING
Type:	Basic Training
ECTS credits:	6
Year:	1
Code:	5614
Teaching period:	First semester
Subject:	Computing
Module:	Basic Training
Teaching type:	Classroom-based
Language:	Inglés
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 into 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.

The Fundamentals of Computer Engineering course is designed to provide a comprehensive overview of Computer Engineering, both as an academic discipline and as a profession. It enables students to understand the foundational pillars of the field (mathematical, physical, anthropological, and ethical) as well as the professional opportunities it offers and the role of the computer engineer in contemporary society.

GOAL

The Fundamentals of Computer Engineering course sets out to achieve the following objectives:

Understand the purpose and social impact of Computer Engineering: Encourage reflection on the ultimate goal of the discipline and its contribution to societal well-being, fostering in students a sense of purpose and an understanding of their future role as engineers.
Establish the foundations of technological progress: Acquire a historical perspective on technological development, identifying the fundamental principles that drive innovation.
Value the human factor and the vocation to serve: Raise awareness of the importance of people in professional practice, promoting a service-oriented ethic and a commitment to the common good.
Explore the professional landscape of Computer Engineering: Gain a general understanding of the various fields within the discipline, as well as the different professional profiles and career paths, encouraging students to reflect on their own vocational direction.
It introduces current paradigms and trends: Provide basic knowledge of contemporary computing models, data management, and an introduction to web development.

PRIOR KNOWLEDGE

Recommended background for access to the Degree Course.

COURSE SYLLABUS

PART I: THEORETICAL FOUNDATIONS

BLOCK 1 - Computer Engineering in Society Background and historical perspectives

Basic definitions and core concepts.
The past, present, and future of ICT Computer Engineering as both an academic discipline and a profession
Competencies and knowledge required of computer engineers.
Career opportunities The role of ethics in the education of computer engineers Deontological codes.

BLOCK 2 - Current Paradigms and Trends in Systems and Applications

Software development: more than just programming.
Structure of computer systems: hardware, software, OOSS, and networks.
Emerging paradigms and trends: Artificial Intelligence, Cloud Computing, Quantum Computing, Cognitive Computing, Blockchain, Smart Cities, and the Internet of Things (IoT).

BLOCK 3. Information and Data

Representation of information in digital format: number systems, representation of numerical and alphanumeric data (codes).
Data foundations.
Big Data foundations.
Laws and ethics.

PART II: PRACTICAL SKILLS — INTRODUCTION TO WEB DEVELOPMENT

BLOCK 1: Introduction to Software Development

Introduction to web development.
Software repositories: Git and Github.

BLOCK 2: Creating Web Pages with HTML5

Basic concepts.
HTTP tags.
Organizing and presenting information.

BLOCK 3: Design and Layout with CSS3

Basic concepts.
Selectors, box model and positioning of elements.

EDUCATION ACTIVITIES

This course aims to provide a broad overview of Computer Engineering from a primarily applied perspective, recognizing that most of the subjects covered will be explored in greater depth throughout the degree programme. Additionally, the course seeks to contribute to the development of essential foundational competencies for future engineers, such as autonomy in work and learning, and both oral and written communication skills.

To achieve these objectives, a variety of teaching methods and learning activities have been combined, including both face-to-face sessions (conducted in classrooms or other spaces with the presence of a lecturer) and non-face-to-face activities. Face-to-face sessions are highly practical in nature, designed to enhance student learning through hands-on engagement.

Face-to-face Activities

Participatory lecture sessions: The lecturer will present the fundamental concepts of the subject, encouraging interaction with students and promoting discussion and questions around the topics covered.
Problem-solving and case studies: Students will apply concepts introduced in lectures to solve problems and exercises. These sessions will involve both individual and group work and will include hands-on practice through web-based projects.
Participatory group activities: Students will present selected work developed throughout the course, fostering communication skills and peer engagement.
Practical sessions using specific technological resources: These classes will focus on the application of cross-disciplinary skills to real-world cases and projects related to the course content.
Academic monitoring and evaluation activities: Ongoing assessments will track student progress and support continuous feedback.

Non-face-to-face Activities

Individual study: Reinforcing the concepts covered in lectures through the preparation of written assignments, reading documentation, studying, and exam preparation.
Collaborative assignment: Working groups will be established to foster teamwork and encourage collaboration. Students will jointly develop a project that applies the concepts learned throughout the course.
Individual assignment: Students will be required to complete an individual piece of work with the aim of demonstrating the knowledge acquired during the practical component of the course.

Additionally, the Canvas will serve as a support platform, providing access to materials, educational resources, activity schedules, and communication channels between students and teaching staff.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
60 Horas	90 Horas

• AF1 - Lecture sessions. 16h • AF2 - Problem-solving or case study sessions. 20h • AF3 - Group participatory activities. 10h • AF4 - Practical classes with specific technological resources. 10h • AFE1 - Academic monitoring and assessment activities. 4h	AFA1 - Personal work and independent study 90h

LEARNING RESULTS

Basic knowledge about the use and programming of computers, operating systems, databases and computer programs with application in engineering.

Knowledge of the structure, organization, operation and interconnection of computer systems, the fundamentals of their programming, and their application to solving engineering problems.

SPECIFIC LEARNING RESULTS

Recognize and use, in explanations or discourse, appropriate hardware and software terminology related to the creation, management, and use of computer systems across the various fields of Computer Engineering.

Identify and relate key historical events in the emergence and evolution of computing and computer science, and explain or analyze future trends in the discipline.

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

Describe the basic principles of the core areas of Computer Engineering: hardware, software, and networks.

Design and develop a web-based application for the dissemination of information.

Conduct research and effectively present a computing project, both orally and in written form.

LEARNING APPRAISAL SYSTEM

ORDINARY CALL

Student performance will be assessed based on the following items:

[1] Written or oral examinations SE1 (50%) - This item includes essay-style, short-answer, or multiple-choice formats (50% of the final grade): Several written assessments will be conducted covering the content developed

throughout the course. A minimum score of 5 out of 10 is required in each individual test in order to pass this component.

Minimum pass mark: 5/10.

[2] Individual and group projects SE3 (40%) - This item is divided into two activities:

Group project (15% of the final mark)
Individual project (25% of the final mark)

Minimum pass mark: 5/10 (every item).

[3] Daily activities, individual and group tasks and exercises - SE2 (10%) - This item will primarily assess punctuality, respect, classroom behavior that promotes a positive learning environment, collaboration with peers, and active participation.

Minimum pass mark: not applicable.
This item will not be marked unless the student has a minimum attendance of 80%.

EXTRAORDINARY CALL

The student must sit a final examination covering all the theoretical and practical content of the course and submit any outstanding practical assignments that have not yet been assessed or in which the minimum required mark was not achieved.

Daily activities, individual and group tasks and exercises item [2] is non-recoverable.

ACADEMIC EXEMPTION

Students who are exempt from class attendance, whether due to a second or subsequent enrolment in the course, or with explicit authorization from the Degree Programme Management, will be assessed using the same types of evaluation.

The group project from item SE3 [2] must be completed individually.
The item SE2 [3] — Daily Activities, Assignments and Individual Exercises will not apply to students granted academic exemption. Instead, this percentage will be added to item [1].

ACADEMIC INTEGRITY

Any form of fraud or plagiarism committed by a student during an assessment activity will be penalized in accordance with the UFV's Code of Conduct.

Plagiarism includes any attempt to deceive the assessment system, such as copying exercises, exams, practical work, assignments, or any other type of submission, whether from another student or from unauthorised sources or devices, with the intention of leading the lecturer to believe the work is their own.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Juan Martinez-Barea. The world to come: discover why the coming decades will be the most exciting in human history/4th ed. Barcelona:Management 2000,2014.
(Juan Martinez-Barea. The world to come: discover why the coming decades will be the most exciting in human history/4th ed. Barcelona:Management 2000,2014. , ||Jon Duckett HTML and CSS: Design and Build Websites 1st edition)

Additional

Bill Thompson. Your website/Barcelona:Molino,2000.

Jakob Nielsen and Marie Tahir. Landing page usability: analysis of 50 Web sites/Madrid:Pearson Education, 2002.

Jakob Nielsen. Designing web usability: [the practice of simplicity]/[United States] :New Riders, 2000.
(Jakob Nielsen. Designing web usability: [the practice of simplicity]/[United States] :New Riders, 2000. , ||Andrew Tanenbaum and Herbert Bos Modern Operating Systems 4th edition)