

Fundamentals of Computer Engineering

Unit 1 Introduction

Teachers: Moisés Martínez (1ºA English)

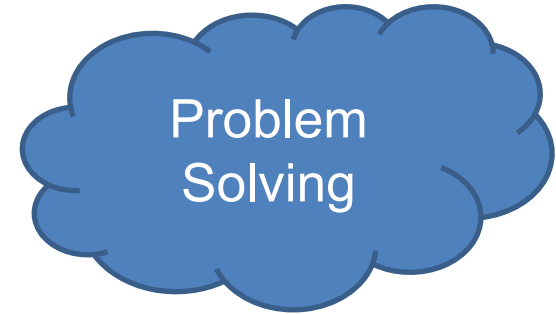
Year: 2022 - 2023

Teaching Guide

- Grade: Computer Science
- Field of Knowledge: Engineering and Architecture
- School: Higher Polytechnic School
- Subject: Fundamentals of Computer Engineering
- Type: Basic Training
- ECTS credits: 6
- Year: First
- Code: 5614
- Teaching period: First semester

Computer Science Engineer

- Person who ingeniously devises the traces and/or ways of achieving or executing something
- Person who has a set of scientific and technological knowledge like:
 - Invention.
 - Innovation.
 - Tools development.
 - Tools improvement.
- Maths, Physics, Chemistry, Computer Programming are tools for the development of technologies using efficiently natural resources and nature forces of nature for the benefit of society.
- Engineering is an activity which try to transform knowledge into something practical.



Description of the Subject

Description of the subject

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

- 150 working hours by the student during the semester.
- 2 parts:
 - Theoretical part - Part I
 - Practical part - Part II

Objectives

- Understanding the concept of **Computer Science and Computer Engineering**: what is the main goal it pursues and the good it brings to society, reflecting on the role that each one wants to play as an engineer in the society of the future.
- Knowing the fundamentals on which technological progress must be based having a first historical perspective of computer science evolution.
- Becoming aware of the importance of the human factor in professional practice and foster a vocation for service and a sense of contribution to the common good.
- Having a global vision of the career, knowing its different knowledge areas understanding the different professional opportunities and profiles to start asking your vocation.
- Providing information about the basic concepts, paradigms, computing trends like Cyber-Security, Big Data, Artificial Intelligence and Web/App development.

Contents

PART I - THEORETICAL FOUNDATIONS

Module 1 - Introduction to Computer Science

- Background and historical perspectives.
- Definitions and basic concepts about computer science Past, present and future of ICT.
- Computer Science as an academic discipline.
- Competencies for the Computer Engineer.
- Career opportunities - Computer Science and Ethics.

Module 2 - Foundations about Computer Science

- Software development: more than just programming.
- Introduction to hardware, networks and software.
- Computer science trends: edge computing, cloud computing, Quantum computing, cognitive computing, blockchain, smart cities, AI, IoT...

Module 3 - Information and data

- Introduction to the concept of information
- Information Foundations: numbering systems, representation of numerical and alphanumeric information (codes).
- Data Foundations: Data Models, Data Security, Data Governance, Data Laws. - Big Data.

Contents

PART I - THEORETICAL FOUNDATIONS

Module 1 - Introduction to Computer Science

- Background and historical perspectives.
- Definitions and basic concepts about computer science Past, present and future of ICT.
- Computer Science as an academic discipline.
- Competencies for the Computer Engineer.
- Career opportunities - Computer Science and Ethics.

Module 2 - Foundations about Computer Science

- Software development: more than just programming.
- Introduction to hardware, networks and software.
- Computer science trends: edge computing, cloud computing, Quantum computing, cognitive computing, blockchain, smart cities, AI, IoT...

Module 3 - Information and data

- Introduction to the concept of information
- Information Foundations: numbering systems, representation of numerical and alphanumeric information (codes).
- Data Foundations: Data Models, Data Security, Data Governance, Data Laws. - Big Data.

PART II - PRACTICAL SKILLS

Module 1 - HTML5 Web pages

- Basic concepts
- Labels
- Organization of information and layout with CSS3

Module 2 - Design and layout with CSS3

- Basic concepts
- Selectors
- Box model
- Positioning of elements

Module 3 - Introduction to JavaScript

- What is JavaScript?
- My first program
- Javascript basic

Activities

- Collaborative and cooperative learning together with the capacity for self-learning.
 - Theoretical lessons.
 - Exercises lessons.
 - Lab sessions (practical work).
 - Work presentation.
- The class work will be completed with a significant load of autonomous work by the student.
- We will use **Aula Virtual** as main learning platform for material repository and communicate tool to improve the student's learning path.

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

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 outcomes

- Recognize and use, in an explanation or speech, the terminology, both hardware and software, involved in the realization, management and operation of a computer system, related to any field of knowledge of computer engineering.
- Describe and relate facts and key historical events in the emergence and evolution of computers and computer science, as well as expose and analyze future trends.
- Explain the fundamentals about the representation of information and apply different mechanisms of representation and organization of both numerical and non-numerical information within a computer system.
- Know and explain the computer science fundamentals: hardware, networks and software.
- Create a web application.
- Properly investigate and present, both oral and writing, a computer science project.

Evaluation Model

Ordinary call

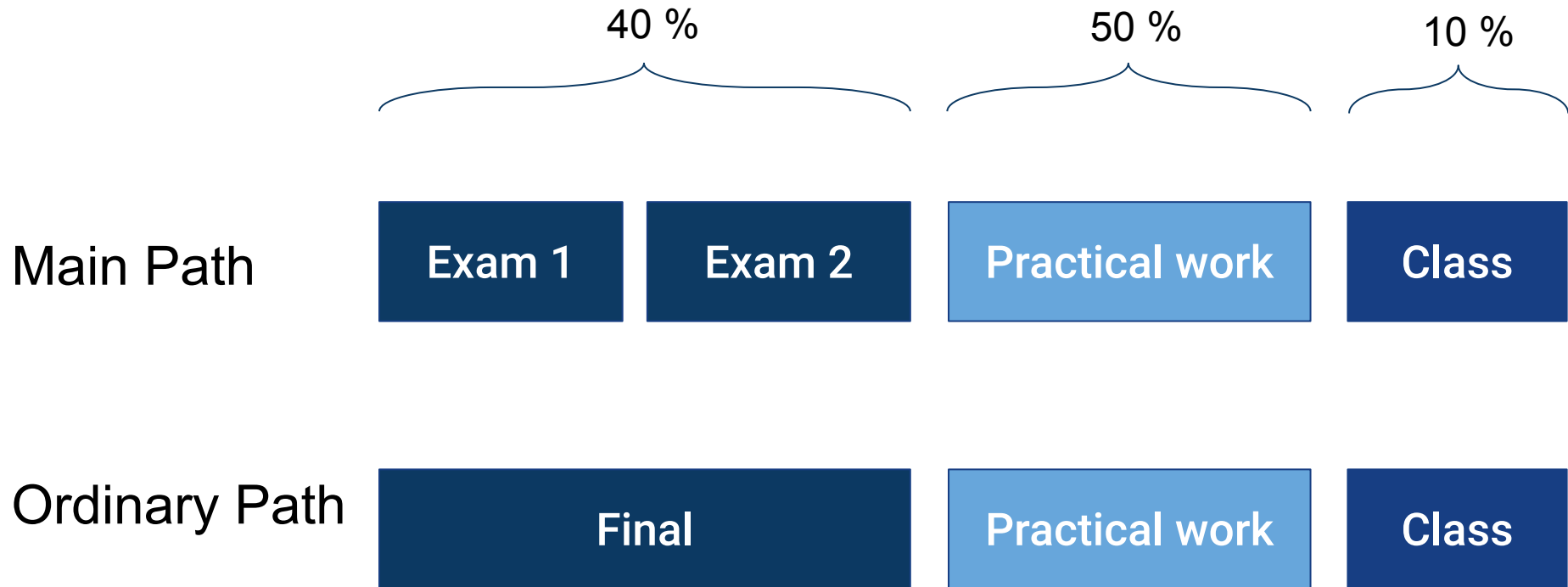
Ordinary evaluation activities:

- Exams: 40% in the final grade.
- Practices and other works related to the subject: 50% in the final grade.
- Participation in class and involvement in the subject: 10% in the final grade, it is mandatory attending at least 80% of the sessions. Otherwise, this type of test will be graded with 0 points.

Rules:

- It is necessary to obtain a minimum of 5 points out of 10 in order to pass the subject in the two first activities.
- If I have failed one of the exams, I have to recover
- If I have failed practices, I have to recover them in ordinary call or in extraordinary.

Ordinary call



Ordinary call – Midterm exam

Exam rules:

- Theoretical-practical nature, with short questions, development questions.
- It will include the first half of the syllabus.
- This exam will be part of the exams part which represent the 40% of the final grade.
- The exam will be scored from 0 to 10, distributing this score equally among all the exercises and sections, unless otherwise indicated.
- The approach to the problems will be evaluated, as well as the correction, presentation and interpretation of the results obtained.
- The exam will be done without transparencies, notes, books or any other material related to the subject.
- The exam will be carried out on each student's personal computer.

Ordinary call – Final exam

Exam rules:

- Theoretical-practical exam at the end of the semester with development questions.
- It will include the second half of the syllabus, although, due to the relationship of all the concepts seen in the subject, it is strongly recommended to review the contents of the first part of the syllabus.
- This exam will represent 30% of the final grade.
- The exam will be scored from 0 to 10, distributing this score equally among all the exercises and sections, unless otherwise indicated.
- The approach to the problems will be evaluated, as well as the correction, presentation and interpretation of the results obtained.
- The exam will be done without transparencies, notes, books or any other material related to the subject.
- The exam will be carried out on each student's personal computer.

Ordinary call – Practical works

Practical works rules:

- All practical works will be in groups.
- A document or presentation about the work can be requested.
- The practical works will represent 50% of the final grade.
- In the case that the teacher deems appropriate, the grade will be affected by the oral defense of the work, up or down, to ensure the authorship of the work.

Ordinary call – Exempted students

- Second or successive enrolment in the subject, either if they have an authorization from the Degree head, will be evaluated by the same type of tests.
- 10% of class participation can be obtained by attending at least **3 tutorials** with the teacher responsible for the subject.
- Mandatory to deliver all the rest activities: practices, minterm exam and final exam.

Extraordinary call

Students who did not reach the minimum grade in the ordinary activities may opt for a recovery at the end of the semester.

- The student stands out only for the parts that have been evaluated below 5.
- I can pass exams and have pending practical works.
- I can pass practical works and have the extraordinary exam pending.

Class participation

- Participation and involvement in class sessions will be a 5% of the final grade.
- The interest shown by the student will be evaluated.
 - Specifically, the rate of attendance at both individual and group tutorials will be computed.
 - The degree of active participation in classes by answering questions from the teacher
 - The study of advanced topics not covered in class
 - The compilation of news that appeared in the media related to the subject
- The grade for this section will be a numerical value between 0 and 10.
- This grade will not be eligible for recovery.

Plagiarism

- Any type of fraud or plagiarism* conducted by the students in an evaluable activity will be sanctioned and will mean a 0 in the score of that part of the subject, cancelling the call in progress.
- This situation, in addition, will be communicated to the Head of the Degree, which in turn will notify following the protocol established at the Francisco de Vitoria University.

*Any type of copying of exam exercises, work reports, exercises, etc., whether in whole or in part, of work belonging to the student with the deception of making the teacher believe that they are their own, will be considered "plagiarism".

Bibliography

- Clark, Dan. Introducción a la Programación Orientada a Objetos. Editorial Anaya Multimedia. Madrid. 2003. ISBN: 978-84-415-1470-6.
- SCHILDT, Herbert. C++: Manual de Referencia. Editorial McGraw-Hill. Madrid. 1995. ISBN: 978-84-481-0321-7.
- Material disponible en el Aula Virtual.
- Joyanes Aguilar, Luis. Programación en C++. Serie Schaum. Editorial McGraw-Hill. Madrid. 2006. ISBN:978-84-481-4643-6.
- Bruegge, Bernd y DUTOIT, Allen. Ingeniería del Software Orientados a Objetos. Editorial Prentice Hall. México. 2002. ISBN: 978-970-26-0010-7.
- Sierra Urrecho, Alejandro y ALFONSECA MORENO, Manuel. Programación en C/C++. Editorial Anaya Multimedia. Madrid. 1999. ISBN: 978-84-415-0847-7.

- Smith, Jo Ann. C++:Programación Orientada a Objetos. Editorial Thomson Paraninfo. Madrid. 1999. ISBN: 978-94-283-2650-6.

