

Academic Year/course: 2022/23

29804 - Fundamentals of computer studies

Syllabus Information

Academic Year: 2022/23

Subject: 29804 - Fundamentals of computer studies

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

ECTS: 6.0

Year: 1

Semester: 440-First semester o Second semester

107-First semester

444-First semester

Subject Type: Basic Education

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process that has been designed for this subject is based on the following:

- **Computer: Machine running algorithms.** The notion of algorithm. Structure of the computer: digital nature, coding, hardware, software. Operating systems. Databases. Programming: Programming styles, the hierarchy of languages, programming elements. Computer networks.
- **Abstraction with procedures.** Data types and schemes of algorithmic composition: concept of data type. Constants and variables. Basic data types: Boolean, character, integer, real. Control structures. Procedures and functions. Algorithms design techniques: treatment of scripts (files and sequential search). Recursion.
- **Data Abstraction.** Tables. Indexed access. Ordination. Abstract data types: modularity, objects and status. Introduction to object-oriented programming. Introduction to object-oriented design techniques.

4.2. Learning tasks

The program offered to the student to help him achieve the expected results includes the following activities:

1. Presentation of the contents of the subject in lectures by teachers.
2. Solving problems in class.
3. Personal study of the subject by students.
4. Development of practices by students, guided by teachers, which develop theoretical knowledge.

5. Development of simple programs of increasing difficulty proposed by the teachers.

Keep in mind that the course has both theoretical and practical orientation. Therefore, the learning process emphasizes both student attendance at lectures, as in the experiments in the laboratory, performing simple programs of increasing difficulty, and individualized study.

4.3. Syllabus

ESCUELA DE INGENIERIA Y ARQUITECTURA DE ZARAGOZA

The course will address the following topics:

Lectures

1. Introduction to computer science
 1. Architecture and Organization of computers
 2. Software and Operating Systems
2. Basic concepts of programming
 1. Algorithms and programs
 2. Programming languages
 3. Symbols, syntax, and semantics
 4. IDE and program generation cycle
3. Introduction to OOP
 1. Simple data and expressions
 2. Control structures
 3. I/O operations
 4. Modularity
 5. Classes and Objects
4. Design of Classes
 1. Members of classes
 2. Composition of classes
 3. Inheritance and polymorphism
 4. Abstract classes
5. Indexed Data Structures
 1. Arrays
 2. Multi-indexed arrays
 3. Strings
6. Operations structured over arrays
 1. Insertion
 2. Elimination
 3. Search
 4. Fusion
 5. Ordination
7. Exceptions and Files
 1. Exceptions
 2. Binary Files
 3. Text Files
8. Additional topics
 1. Collections
 2. Interfaces
 3. Recursion
 4. Dynamic data structures

Computer Lab sessions

1. Operating Systems. Command-line.
2. Edit, compile y execute. Programming environment.
3. Simple data. Sequential and Conditional Scheme

4. Iterative Scheme
5. Design of classes (I)
6. Design of classes (II)
7. Arrays y Strings
8. Multidimensional Arrays
9. Binary Files
10. Text Files

ESCUELA POLITÉCNICA DE TERUEL

The course will address the following topics:

Lectures

1. Introduction to Computer Science and programming
 - Computer science and computers. Historical evolution of computers
 - Information representation
 - Algorithms and software
 - Computer Architecture: Hardware and Software
 - Programming languages: classification
 - Translators of programming languages: Compilers and Interpreters
 - Operating Systems
 - Internal Architecture
 - Processor instructions execution
 - Peripherals: Storage, input/output systems
3. Basic Elements of the C Programming Language
 - C Program General Structure
 - Variables and constants
 - Simple data types in C
 - Operators, expressions and instructions
 - Types of operators: arithmetics, relational, and logical operators
 - Pointers
 - Standard Input /Output
5. Control Structures
 - Loops
 - Nested Control Structures
7. Functions
 - Modular programming
 - Function calls
 - Parameters to functions: call by value and by reference
 - Variable declarations. Visibility
 - Function libraries
 - C standard libraries
9. Structured data types
 - Use of arrays
 - Pointers and arrays
 - Strings
 - Data structures defined by the user (records)
 - Structures arrays
 - Structures arrays in functions
11. Input/Output

First-level operations

Second-level operations

13. Search and sorting algorithms

Computer Lab sessions

1. Variables, constants, data types, expressions, and operators. Input/Output instructions
2. Control structures
3. Functions, strings, arrays, and multidimensional arrays
4. Structured data types, Pointers, and Files

4.4. Course planning and calendar

ESCUELA DE INGENIERIA Y ARQUITECTURA DE ZARAGOZA

Planning

6 credits of the course corresponding to 150 hours of student work, broken down into:

- 60 on-site hours
 - 30 hours lectures (T1) : 2 hours per week about
 - 10 hours case studies (T2) : 1 hour per week about
 - 20 hours laboratory practice (T3) : 10 sessions of 2 hours
- 90 autonomous hours
 - 60 hours of practical work
 - 25 hours of autonomous study
 - 5 hours of test

Calendar

The detailed schedule of different activities in the course will be established once the University and the Centre have approved the corresponding academic calendar.

ESCUELA POLITÉCNICA DE TERUEL

Planning

6 credits of the course corresponding to 150 hours of student work, broken down into:

- 60 on-site hours
 - 30 hours lectures (T1): 2 hours per week
 - 30 hours laboratory practice (T3): 2 hours per week
- 90 hours of autonomous study
 - 60 hours of practical work
 - 27 hours of autonomous study
 - 3 hours of test

At the EUPT, the course is offered in two different modalities: face-to-face and blended learning. For the face-to-face mode, all of the above applies. In the blended learning mode, the distribution of credits is slightly different, since the classroom hours are reduced to those strictly necessary (taking the exam). Taking into account that the characteristics of the course, students enrolled in blended mode may carry out the pursuit of the course in a non-face-to-face manner.

Calendar

The detailed schedule of different activities in the course will be established once the University and the Centre have approved the corresponding academic calendar.