Universidad Zaragoza

Academic Year/course: 2021/22

29804 - Fundamentals of computer studies

Syllabus Information

Academic Year: 2021/22
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

- ***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 learning process that has been designed for this course is based on the following:

1. Presentation of the contents of the course in lectures by teachers.
2. Solving problems in class.
3. Personal study of the course by students.
4. Development practices by students, guided by teachers who 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

COURSE SYLLABUS

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 Objets
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

LABORATORY PRACTICE PROGRAM

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

COURSE SYLLABUS

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

LABORATORY PRACTICE PROGRAM

1. Variables, constants, data types, expressions, and operators. Input/Output instructions
2. Operator precedence, strings, pointers
3. Choice control structures
4. Loop control structures
5. Functions
6. Structured data types: arrays and multidimensional arrays
7. Structured data types: Data structures defined by the user
8. Pointers
9. Text and binary 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
  - Type one activities (theory classes): two hours per week, one group.
  - Type two activities (problem classes): one hour per week, two groups.
  - Type three activities (laboratory classes): one hour per week, two groups.
- 90 hours of autonomous study (study of texts and course notes, problem-solving, class preparation, classes and problem preparation, and programs development.

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.