Universidad Zaragoza

29804 - Fundamentals of computer studies

Información del Plan Docente

Academic Year	2016/17
Academic center	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
Course	1
Period	Half-yearly
Subject Type	Basic Education
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

- Computer: Machine running algorithms . Notion of algorithm. Structure of the computer: digital nature, coding, hardware, software. Operating systems. Databases. Programming: Programming styles, 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.

5.2.Learning activities

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

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 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.

5.3.Program

ESCUELA DE INGENIERIA Y ARQUITECTURA DE ZARAGOZA

COURSE SYLLABUS

1. Introduction to computer science
   - Architecture and Organization of computers
   - Software and Operating Systems
   - Hardware
2. Basic concepts of programming
3. Introduction to OOP
   - Simple data and expressions
   - Control structures
   - I/O operations
   - Modularity
   - Classes and Objets
4. Design of Classes
   - Members of classes
   - Composition of classes
   - Inheritance and polymorphism
   - Abstract classes
5. Indexed Data Structures
6. Operations structured over arrays
7. Excepctions and Files
8. Additional topics
   - Collections
   - Interfaces

LABORATORY PRACTICE PROGRAM

1. Programming environment
2. Simple data. Sequential and Conditional Scheme
3. Iterative Scheme
4. Design of classes (I)
5. Design of classes (II)
6. Arrays y Strings
7. Multidimensional Arrays
8. Operations structured over arrays
9. Binary Files
10. Text Files

29804 - Fundamentals of computer studies

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
2. Computer Architecture: Hardware and Software
1. Computer Software
1. Programming languages: classification.
2. Translators of programming languages: Compilers and Interpreters
3. Operating Systems
2. Computer Hardware
1. Internal Architecture
2. Processor instructions execution
3. Peripherals: Storage, input/output systems
3. Basic elements of the C Programming Language
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
4. Control Structures
1. Choice
2. Loops
3. Nested Control Structures
5. Functions
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
6. Structured data types
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
7. Input/Output
1. First-level operations
2. Second-level operations
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

5.4.Planning and scheduling

ESCUELA DE INGENIERIA Y ARQUITECTURA DE ZARAGOZA

Planning

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

- 60 presential 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 non-presential hours
  - 60 hours of practical work
  - 25 hours of personal 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.

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Planing

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

- 60 presential 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 self-study effective (study of texts and course notes, Troubleshooting, class preparation, classes and problems 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.

5.5.Bibliography and recomended resources

ESCUELA DE INGENIERIA Y ARQUITECTURA DE ZARAGOZA

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- Barnes, David J.. Programación orientada a objetos con Java : una introducción práctica usando BlueJ / David J. Barnes, Michael Kölling . - 5ª ed. Madrid : Pearson Educación, D. L. 2013
- Eckel, Bruce. Piensa en Java / Bruce Eckel ; traducción, Jorge González Barturen ; revisión técnica, Javier Parra Fuente, Ricardo Lozano Quesada ; coordinación general y revisión técnica, Luis Joyanes Aguilar . - 4ª ed. Madrid [etc.] : Prentice Hall, D.L. 2002
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ESCUELA POLITÉCNICA DE TERUEL

- Kernighan y Ritchie. El Lenguaje de Programación C. Prentice-Hall 1978
- Noel Kalicharan. Learn to Program with C. Apress 2015
- Gabriela Márquez, Sonia Osorio, Noemí Olvera. Introducción a la programación Estructurada en C. PEARSON (Prentice-Hall) 2011
- Richard Reese. Understanding and Using C Pointers. O'REILLY 2013
- Teach yourself C in 21 Days. SAMS (Prentice-Hall) 1994