Universidad Zaragoza

Year : 2019/20

30105 - Fundamentals of computer studies

Syllabus Information

Academic Year: 2019/20
Subject: 30105 - Fundamentals of computer studies
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
179 - Centro Universitario de la Defensa - Zaragoza
Degree: 457 - Bachelor's Degree in Industrial Organisational Engineering
563 - Bachelor's Degree in Industrial Organisational Engineering
425 - Bachelor's Degree in Industrial Organisational Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject Type: Basic Education
Module: ---

1.General information

1.1.Aims of the course

1. Solving a problem by creating small programs. The main course concern is programming. It includes problem specification, exploring diverse algorithmic solutions, better solution selection, and translation to an executable computer program.
2. Knowing fundamental parts of a computer. Understanding their internal structure, searching information and applying it to solving problems.

1.2.Context and importance of this course in the degree

Fundamentals of computer studies is a basic education subject. This subject is located at second course. This particular location in the early stages of the degree allows students to apply in the rest of the subjects of the degree the acquired knowledge, which to a greater or lesser extent need to rely on computer tools for the resolution of problems.

1.3.Recommendations to take this course

The same recommendations as for an engineering course apply here.

No previous programming knowledge is necessary.

2.Learning goals

2.1.Competences

Upon passing the subject, the student will be more competent to:

C04 - Solve problems and take decisions with initiative, creativity and critical reasoning.
C05 - Apply Information and Communication Technologies (ICTs) within the field of engineering.
C14 - Basic knowledge about computer use and programming, operative systems, databases and computer programs for engineering.

2.2.Learning goals

The student, to pass this subject, must demonstrate the following results:

Ability to analyze problems, and design and implement algorithmic solutions to these problems.
Ability to solve problems in a disciplined way, obtaining a correct, efficient and efficient implementation.
Ability to use computers at the user level, as well as using operating systems and programming environments.
Knowledge about the computer equipment, both at the physical and logical levels.
Ability to identify information needed to solve problems, to retrieve it, to interpret it and to apply it to the resolution.

2.3.Importance of learning goals

This subject is the first contact with the concepts and abilities that constitute the "engineer's way of thinking", and that allow

to put it into practice with real problems from the beginning. If we attend to problem resolution, Computing deals with the knowledge, design and use of computing and computer technology, constituting
a discipline that:
- Develops the ability to express solutions such as algorithms, and their role in related areas such as system design, problem solving, simulation and modeling.
- It requires a disciplined approach to solving problems, from which quality solutions are expected.
- Control the problem complexity, first through abstraction and simplification, then to design solutions by integration of components (divide-and-conquer approach).
- It facilitates the understanding of the opportunities offered by process automation, and how people interact with computers.
- It facilitates the learning, through experimentation, of basic principles such as conciseness and elegance, as well as the recognition of bad practices.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

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A theoretical-practical test will take place when the classes have finished. This test will represent the other part of the final grade and it is mandatory to be passed. This examination is divided into two parts, not keeping parts between calls:
- A theoretical test, which evaluates the knowledge and know-how of everything learned (in master classes, problems, practices, projects ...).
- A practical test in the form of problem solving, in which the programming skills acquired during the course must be demonstrated.

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

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

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The subject is strongly based on practice, so it has many practical works in class.

The organization of teaching will be carried out using the following steps:

- Lectures: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- Practice Sessions: The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- Laboratory Workshop: The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.
- Individual Tutorials: Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

Further information regarding the course will be provided on the first day of class.

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All the activities that are included in the course on a daily basis are considered for the final evaluation. Therefore, the evaluation of the course is done in a continuous manner through several or all of these elements: exercises, participation, lab sessions, projects, tests and final exam.

4.2.Learning tasks

The course includes the following learning tasks:

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Face-to-face generic activities:

- Theory Classes: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary.
- Practical Classes: Problemas and practical classes are carried out, complementary to the theoretical concepts studied.
- Laboratory Workshop: This work is tutored by a teacher, in groups of no more than 20 students.

Generic non-class activities

- Study and understanding of the theory taught in the lectures.
- Understanding and assimilation of the problems and practical classes solved in the practical classes.
- Solving proposed problems, project, etc.
- Preparation of laboratory workshops, preparation of summaries and reports.
- Preparation of the written tests for continuous assessment and final exams.

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The different activities programmed during the course (exercises, lab sessions, etc.) are used in all the parts of the program in order to achieve the specific objectives of Fundamentals of Computer Science and some general objectives of the degree.

4.3.Syllabus

The course will address the following topics:

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1-Theoretical contents

Part I

- Computer: Machine that executes algorithms. Algorithm definition. Computer architecture: digital nature, codification, hardware, software.
- Operating systems.
- Data bases
- Programming: programming styles, language hierarchy, programming elements
- Nets of computers.

Part II

- Introduction
- Function design
- Text and input/output
- Conditional branching
- Introduction to classes and objects
- Lists
- Iteration

Part III

- Other collecions: sets, tuples, dictionaries
- Designing algorithms
- Search and sorting
- Files

Part IV

- Classes, objects and methods

2-Practical contents

Every part has related practices. As the concepts are shown, the practices are going to be presented, in the classroom or in moodle platform.

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The program of the course includes the next topics:

1. Computer architecture, hardware and software.
2. Languages and programming interface.
3. Predefined data types.
4. Modular programming I (procedures).
5. Control structures (conditional sentences and loops).
6. Modular programming II (functions).
7. Error control and files.
8. Advanced data types I (records).
9. Advanced data types II (vectors and matrices).
10. Algorithms on vectors (insertion, removal, sort and search).

4.4.Course planning and calendar

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The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table.

- 1 hour of lectures
- 3 hour of laboratory workshops
- 6 hours of other activities

Nevertheless, the previous table can be shown in greater detail, taking into account the following overall distribution:

- 16 hours of lectures.
- 42 hours of laboratoy workshop.
- 2 hours of wirtten assessment tests, one hour per test.
- 45 hours of exercices and tutelated work, divided up the 15 weeks of the second semester.
- 45 hours of personal study, divided up the 15 weeks of the second semester.

There is a tutorial calendar timetable set by the teacher taht can be requested by the students who want a tutorial.

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During the semester there will be a series of activities like exercises, lab sessions, projects, tests, etc. After the semester, there will be an exam including theory and practice.

The projects/lab sessions will be conducted in teams of 2 persons and they will be submitted online before the due date. It will be the authors' responsibility to comply with the deadline and to include the authorship details in the files that were submitted.

4.5.Bibliography and recommended resources

Defence profile

Bibliography and recommended resources are available at: http://biblos.unizar.es/br/br_citas.php?codigo=30105&year=2019