

Course guide

300212 - I2 - Informatics II

Last modified: 01/06/2023

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 701 - DAC - Department of Computer Architecture.

Degree: BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING (Syllabus 2015). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Definit a la infoweb de l'assignatura.

Others: Definit a la infoweb de l'assignatura.

PRIOR SKILLS

It is very convenient for students to have a personal computer (ideally a laptop) with an Internet connection. There are no additional requirements.

REQUIREMENTS

Prerequisite:
Informàtica 1.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:

CG2. (ENG) CG2 - Planificación, redacción, dirección y gestión de proyectos, cálculo y fabricación en el ámbito de la ingeniería aeronáutica que tengan por objeto, de acuerdo con los conocimientos adquiridos, los vehículos aeroespaciales, los sistemas de propulsión aeroespacial, los materiales aeroespaciales, las infraestructuras aeroportuarias, las infraestructuras de aeronavegación y cualquier sistema de gestión del espacio, del tráfico y del transporte aéreo.

Transversal:

CT4. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

CT6. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

CT7. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

CT3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.

Basic:

CB1. (ENG) CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la

educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio

CB2. (ENG) CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio

CB4. (ENG) CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado

CB5. (ENG) CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía

TEACHING METHODOLOGY

The course combines the following teaching methodologies:

- Self-study, because students will work on the self-study material out of the classroom.
- Cooperative learning, because students will be organized in small groups to perform some of the course tasks.
- Project-based learning, because students will develop a team project during the course.
- Self-evaluation and peer evaluation of some of the deliveries.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course of Informatics 2, the student must be able to:

- Build object-oriented applications with a visual interface, using the appropriate programming environment.
- Use advanced data structures and algorithms and dynamic memory management techniques.
- Design databases, elaborate queries and properly use a database manager.
- Describe the characteristics of current computers.
- Present their work properly, both orally and in writing.
- To learn autonomously, assimilating information from its reference, searching for relevant information in the learning process and identifying its errors.
- Working in a group, identifying the tasks to be carried out, distributing them and integrating the results, resolving the conflicts that occur in the group and identifying aspects to improve the way it works.

STUDY LOAD

Type	Hours	Percentage
Self study	63,0	56.00
Guided activities	23,0	20.44
Hours small group	26,5	23.56

Total learning time: 112.5 h



CONTENTS

The architecture of today's computers

Description:

- 1.1 Laptop computers
- 1.2 Parallel computers
- 1.3 Supercomputers

Related activities:

Activity 1

Full-or-part-time: 10h

Laboratory classes: 3h

Guided activities: 2h

Self study : 5h

Object oriented programming and visual programming

Description:

- 2.1 The concept of object and class: attributes and methods
- 2.2 Criteria for decomposition into modules and objects
- 2.3 Builders
- 2.4 Parameter and object passing techniques
- 2.5 Objects that are members of other objects
- 2.6 Forms and Events
- 2.7 Most common controls and events

Related activities:

Activity 2

Full-or-part-time: 45h

Laboratory classes: 13h

Guided activities: 6h 15m

Self study : 25h 45m

Advanced data structures and algorithms

Description:

- 3.1 Sorter algorithms
- 3.2 Search algorithms
- 3.3 Lists and circular queues
- 3.4 Stacks

Related activities:

Activity 2

Full-or-part-time: 33h

Laboratory classes: 8h

Guided activities: 4h

Self study : 21h



Databases

Description:

- 4.1 Introduction to database management systems
- 4.2 Data modeling
- 4.3 Designing the structure of a database
- 4.4 Database queries and data manipulation

Related activities:

Activity 2

Full-or-part-time: 6h

Laboratory classes: 2h

Guided activities: 2h

Self study : 2h

Programming environment

Description:

- 5.1 The C# programming environment
- 5.2 Creation of projects, classes, class libraries
- 5.3 Form creation
- 5.4 Debugging applications

Related activities:

Activity 2

Full-or-part-time: 18h 30m

Laboratory classes: 6h 15m

Guided activities: 3h

Self study : 9h 15m

ACTIVITIES

HOW ARE THE CURRENT COMPUTERS?

Description:

The autonomous learning activities will consist of the study of self-learning material, individual exercises (with frequent self-evaluations) and small group exercises.

The class sessions will be dedicated to:

- Resolution of doubts of the weekly work, in small groups
- Resolution of the most frequent doubts by the teacher
- Some expository sessions on key aspects
- Individual and small group exercises

Cooperative work will be a key element in the course methodology.

Specific objectives:

At the end of this activity, students will be able to:

- Describe the elements and blocks that typically appear on today's laptops.
- Describe the main features of parallel computers
- Describe the main features of today's supercomputers and some of their applications.

Material:

- Self-study material with topic contents
- Individual and group exercise statements
- A detailed plan of activities and deliveries

All material will be available through Atenea

Delivery:

The activity is assigned a series of individual and group deliveries (at least one delivery per week). On the basis of these deliveries, the relevant feedback processes will be articulated.

The timely completion of at least 80% of the course deliveries will be a necessary condition for passing the course.

Some of the deliveries are, in fact, tests of basic learning objectives.

Full-or-part-time: 10h

Laboratory classes: 3h

Guided activities: 2h

Self study: 5h

ADVANCED PROGRAMMING PROJECT

Description:

In this activity, the students will carry out a programming project.

The directed and autonomous learning activities consist basically of:

- Study of self-learning material
- Carrying out individual and group exercises
- Realization of individual project tasks
- Group meetings to carry out project tasks.
- Realization of the design and planning of the different prototypes of the project.

The activities that will be done in the class sessions are:

- Resolution of doubts of the weekly work, in small groups.
- Resolution of the most frequent doubts by the teacher
- Some expository sessions on key aspects
- Individual and small group exercises
- To carry out individual project tasks
- Group meetings to carry out project tasks.

In this activity, special attention will be given to the written and oral presentation of the work carried out by the teams.

Specific objectives:

At the end of this activity, students will be able to:

- Adequately subdivide the problem to be solved into objects
- Correctly encode sort and search algorithms
- Implement circular queues and stacks.
- Build attractive and functional visual interfaces.

In addition, in the context of this activity, students will develop generic competences.

Material:

The material will be as follows:

- Self-learning material with the contents of the topic.
- The Microsoft Visual Studio programming environment.
- Individual and group exercise statements
- A detailed plan of activities and deliveries

All material will be available through Atenea

Delivery:

The activity is assigned a series of individual and group deliveries (at least one delivery per week). On the basis of these deliveries, the relevant feedback processes will be articulated.

The timely completion of at least 80% of the course deliveries will be a necessary condition for passing the course. Some of the deliveries are, in fact, proof of basic learning objectives.

The activity also has three important deliveries related to the outcome of the project and contribute a total of 40% to the final qualification of the subject.

Full-or-part-time: 102h 30m

Laboratory classes: 29h 15m

Guided activities: 15h 15m

Self study: 58h

GRADING SYSTEM

Defined to the subject infoweb.



EXAMINATION RULES.

In order to pass the course, it will be necessary to make at least 80% of the course deliveries on time.

BIBLIOGRAPHY

Basic:

- Platt, David S. Introducing Microsoft .NET. 3rd ed. Redmond: Microsoft Press, 2003. ISBN 0735619182.
- Archer, Tom; Whitechapel, Andrew. Inside C#. 2nd ed. Redmond, Washington: Microsoft Press, 2002. ISBN 0735616485.
- Sharp, John; Jagger, Jon. Microsoft Visual C#. NET : step by step [on line]. Redmond: Microsoft Press, 2003 [Consultation: 22/11/2023]. Available on : <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=7117342>. ISBN 0735619093.

Complementary:

- Ceballos Sierra, Francisco Javier. El Lenguaje de programación C#. Madrid: RA-MA, 2002. ISBN 8478975004.