300212 - I2 - Informatics II

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 701 - AC - Department of Computer Architecture
Academic year: 2019
Degree: BACHELOR’S DEGREE IN AEROSPACE SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR’S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING - NETWORK ENGINEERING (AGRUPACIÓ DE SIMULTANEITAT) (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR’S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR’S DEGREE IN NETWORK ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
ECTS credits: 4,5
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: Definit a la infoweb de l'assignatura.
Others: Definit a la infoweb de l'assignatura.

Opening hours
Timetable: Defined to the subject infoweb.

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:
3. PROJECT MANAGEMENT - Level 2: Define the objectives of a well-defined, narrow scope, and plan development, identifying resources, tasks, shared responsibilities and integration. Use appropriate tools to support project management.
7. EFFICIENT USE OF EQUIPMENT AND INSTRUMENTS - Level 2: Use the correct instruments, equipment and laboratory software for specific or specialized knowledge of their benefits. A critical analysis of the experiments and results. Correctly interpret manuals and catalogs. Working independently, individually or in groups, in the laboratory.

Transversal:
1. 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.
2. 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.
4. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of
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.

### 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:
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- 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.
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- 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

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
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<tbody>
<tr>
<td>Hours large group:</td>
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<tr>
<td>0h</td>
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<td>0.00%</td>
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<td>Hours medium group:</td>
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<tr>
<td>Hours small group:</td>
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<tr>
<td>26h 30m</td>
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<tr>
<td>23.56%</td>
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<tr>
<td>Guided activities:</td>
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<tr>
<td>23h</td>
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<td>20.44%</td>
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<tr>
<td>Self study:</td>
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<tr>
<td>63h</td>
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<tr>
<td>56.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time:</th>
<th>Description</th>
<th>Related activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The architecture of today's computers</strong></td>
<td>10h</td>
<td></td>
<td>Activity 1</td>
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<tr>
<td></td>
<td></td>
<td><strong>Description:</strong></td>
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<tr>
<td></td>
<td></td>
<td>1.1 Laptop computers</td>
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<td>1.2 Parallel computers</td>
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<td>1.3 Supercomputers</td>
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<tr>
<td></td>
<td>Laboratory classes: 3h</td>
<td>Guided activities: 2h</td>
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<td></td>
<td>Self study: 5h</td>
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<tr>
<td><strong>Object oriented programming and visual programming</strong></td>
<td>45h</td>
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<td>Activity 2</td>
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<td><strong>Description:</strong></td>
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<td></td>
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<td>2.1 The concept of object and class: attributes and methods</td>
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<td>2.2 Criteria for decomposition into modules and objects</td>
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<td>2.3 Builders</td>
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<td>2.4 Parameter and object passing techniques</td>
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<td>2.5 Objects that are members of other objects</td>
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<td>2.6 Forms and Events</td>
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<td>2.7 Most common controls and events</td>
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<td>Laboratory classes: 13h</td>
<td>Guided activities: 6h 15m</td>
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<td>Self study: 25h 45m</td>
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<tr>
<td><strong>Advanced data structures and algorithms</strong></td>
<td>33h</td>
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<td>Activity 2</td>
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<td></td>
<td></td>
<td><strong>Description:</strong></td>
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<td></td>
<td></td>
<td>3.1 Sorter algorithms</td>
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<td>3.2 Search algorithms</td>
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<td>3.3 Lists and circular queues</td>
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<td>3.4 Stacks</td>
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<td>Laboratory classes: 8h</td>
<td>Guided activities: 4h</td>
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<td>Self study: 21h</td>
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### Databases

**Learning time:** 6h  
Laboratory classes: 2h  
Guided activities: 2h  
Self study: 2h

**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

### Programming environment

**Learning time:** 18h 30m  
Laboratory classes: 6h 15m  
Guided activities: 3h  
Self study: 9h 15m

**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
# Planning of 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.

**Support materials:**
- 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

**Descriptions of the assignments due and their relation to the assessment:**
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.

**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.

<table>
<thead>
<tr>
<th>Hours: 10h</th>
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<tbody>
<tr>
<td>Laboratory classes: 3h</td>
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<tr>
<td>Guided activities: 2h</td>
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<td>Self study: 5h</td>
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</tbody>
</table>

## ADVANCED PROGRAMMING PROJECT

**Hours: 102h 30m**

<table>
<thead>
<tr>
<th>Laboratory classes: 29h 15m</th>
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<tbody>
<tr>
<td>Guided activities: 15h 15m</td>
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<td>Self study: 58h</td>
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**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.

**Support materials:**
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

**Descriptions of the assignments due and their relation to the assessment:**
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.

**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.
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**Qualification system**

Defined to the subject infoweb.

**Regulations for carrying out activities**

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

**Bibliography**

**Basic:**


**Complementary:**