

340020 - INFO-N1023 - Informatics

Coordinating unit:	340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit:	723 - CS - Department of Computer Science
Academic year:	2019
Degree:	BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits:	6
Teaching languages:	Catalan, Spanish

Teaching staff

Coordinator:	Roman Jiménez, José Antonio
Others:	Baixeries Juvilla, Jaume Casas Fernández, Bernardino Hernandez Gomez, Angels Merenciano Saladrígues, Josep Maria Román Jiménez, José Antonio

Prior skills

Basic knowledge of mathematics for the required level at the university entrance exam.

Degree competences to which the subject contributes

Specific:

2. CE3. Fundamental knowledge of use and programming of computer, operating systems, data base and informatic programs with application in engineering.

Transversal:

1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
3. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.
4. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
5. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

Teaching methodology

The course consists of:

- 2 hours per week of theory class in the classroom (large group) where the teacher presents content,
- 2 hours every fortnight in the classroom lab (small group) where evaluable group activities are proposed and performed.

Learning objectives of the subject

The fundamental objective of the Information Technology course is learn to program in a high-level language, and

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implement programs to solve problems in science and technical areas.

To pass the course, students should be able to:

- Understand the basic concepts associated with computer hardware and software: the structure of computers and operating systems.
- Understand the fundamental concepts of computer programming.
- Develop skills in using basic tools and techniques of programming: algorithms and programs.
- Develop the capacity of abstraction in the use of programming schemes to solve real problems.
- Design well-structured and readable programs.
- Conduct a programming project of average complexity.

Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	30h	20.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

<p>1. Introduction to Programming</p>	<p>Learning time: 10h Theory classes: 2h Laboratory classes: 2h Self study : 6h</p>
<p>Description: 1.1. Fundamental definitions 1.2. Problem Solving Cycle with the Computer 1.3. Functional Structure of the Computer 1.4. Primitive Instructions</p> <p>Related activities: Activity 1: Problems about primitive instructions Activity 4: Cuestionarios Activity 5: Control 1 Activity 7: Control 2</p>	
<p>2. Data Types, Operations and Variables</p>	<p>Learning time: 25h 15m Theory classes: 4h Laboratory classes: 5h 15m Self study : 16h</p>
<p>Description: 2.1. Variables 2.2. Data Types 2.3. Expressions</p> <p>Related activities: Activity 1: Problems about writing and evaluating expressions Activity 4: Questionnaires Activity 5: Control 1</p>	

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<p>3. Control Statements and functions</p>	<p>Learning time: 28h 15m</p> <p>Theory classes: 4h Laboratory classes: 5h 15m Guided activities: 1h Self study : 18h</p>
<p>Description:</p> <ul style="list-style-type: none"> 3.1. Sequential Construction 3.2. Conditional Construction 3.3. Iterative Construction 3.4. Functions <p>Related activities:</p> <ul style="list-style-type: none"> Activity 4: Questionnaires Activity 5: Control 1 Activity 7: Control 2 	
<p>4. Sequences and Iterative Schemes</p>	<p>Learning time: 25h 45m</p> <p>Theory classes: 6h Laboratory classes: 3h 45m Guided activities: 1h Self study : 15h</p>
<p>Description:</p> <ul style="list-style-type: none"> 4.1. Sequence Schemes <ul style="list-style-type: none"> 4.1.1. Linear Scheme 4.1.2. Search Scheme 4.2. Generic Sequences 4.3. Data Flows <p>Related activities:</p> <ul style="list-style-type: none"> Activity 4: Control 1 Activity 6: Making a stage of the activity 6 corresponding to practices 	

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5. Lists	Learning time: 6h Theory classes: 6h
<p>Description:</p> <ul style="list-style-type: none"> 5.1. Sequences, Lists and Strings <ul style="list-style-type: none"> 5.1.1. Lists 5.1.2. Strings 5.2. Schemes on lists <ul style="list-style-type: none"> 5.2.1. Linear scheme 5.2.2. Search scheme 5.3. Lists and functions <ul style="list-style-type: none"> 5.3.1. Pass parameters with lists 5.3.2. Multiple return of functions <p>Related activities:</p> <ul style="list-style-type: none"> Activity 4: Questionnaires Activity 6: Finishing the activity 6 corresponding to practices Activity 7: Control 2 	
6. Matrices	Learning time: 21h 45m Theory classes: 4h Laboratory classes: 1h 45m Guided activities: 2h Self study : 14h
<p>Description:</p> <ul style="list-style-type: none"> 6.1. Matrices 6.2. Matrix Schemes <ul style="list-style-type: none"> 6.2.1. Linear Scheme 6.2.2. Search Scheme <p>Related activities:</p> <ul style="list-style-type: none"> Activity 4: Questionnaires Activity 6: Making a stage of the activity 6 corresponding to practices Activity 7: Control 2 	



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7. Modular Design and Problem Solving	Learning time: 20h 45m Theory classes: 2h Laboratory classes: 1h 45m Self study : 17h
<p>Description:</p> <ul style="list-style-type: none">7.1. Design and Use of Modules7.2. Scope and Visibility of Identifiers <p>Related activities:</p> <p>Activity 6: Finishing the activity 6 corresponding to practices</p>	

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Planning of activities

1. PROBLEMS ABOUT PRIMITIVE INSTRUCTIONS	Hours: 0h 15m Laboratory classes: 0h 15m
<p>Description: Solve a problem of the topic in course, in the classroom. The problem will be chosen at random from a list proposed by teachers. Individual activity.</p> <p>Support materials: List of problems available at Atenea.</p> <p>Descriptions of the assignments due and their relation to the assessment: Solution of the problem given by the student. The sum of activities 1, 2 and 3, all with the same weight, represents 15% of the final grade.</p> <p>Specific objectives: At the end of the activity, the student should be able to:</p> <ul style="list-style-type: none"> - Know primitive instructions of the programming language studied. - Run a simple program manually and show how input/output channels and memory have changed. 	
3. PROBLEMS ABOUT EXPRESSION EVALUATION	Hours: 0h 15m Laboratory classes: 0h 15m
<p>Description: Solve a problem of the topic in course, in the classroom. The problem will be chosen at random from a list proposed by teachers. Individual activity.</p> <p>Support materials: List of problems available at Atenea.</p> <p>Descriptions of the assignments due and their relation to the assessment: Solution of the problem given by the student. The sum of activities 1, 2 and 3, all with the same weight, represents 15% of the final grade.</p> <p>Specific objectives: At the end of the activity, the student should be able to:</p> <ul style="list-style-type: none"> - Know control statements in the programming language studied. - Trace a program that contains control statements and understand what it does. - Know when to use a control statement. - Build programs by using correct variables, expressions and control statements. 	
3. PROBLEMS ABOUT LISTS AND ITERATIVE SCHEMES	Hours: 0h 15m Laboratory classes: 0h 15m
<p>Description: Solve a problem of the topic in course, in the classroom. The problem will be chosen at random from a list proposed by teachers. Individual activity.</p> <p>Support materials: List of problems available at Atenea.</p>	

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

Solution of the problem given by the student.

The sum of activities 1, 2 and 3, all with the same weight, represents 15% of the final grade.

Specific objectives:

At the end of the activity, the student should be able to:

- Knowing the implementation of the sequences in the programming language studied.
- Create, access and modify a sequence implemented as a list or as a string.
- Apply iterative schemes on sequences.
- Write correct programs that use iterative schemes on any sequence.

4. QÜESTIONARIS

Hours: 0h 45m

Laboratory classes: 0h 45m

Description:

Completion of self-assessed questionnaires (Atenea) to check up the subject comprehension.

Support materials:

Self-assessed questionnaires available at Atenea.

Collection of problem statements.

Laboratory manual available at Atenea.

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

Students may complete each questionnaire along a deadline. All questionnaires are online. The whole set of questionnaires contributes 5% in the final grade.

5. CONTROL 1

Hours: 2h

Guided activities: 2h

Description:

Individual test which includes the first three issues of the course, consisting of solving a number of problems by hand.

Support materials:

Exam questions.

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

Solutions of the exam questions given by the student.

Control 1 represents 25% of the final grade.

Specific objectives:

At the end of the activity, the student must have achieved the specific objectives of topics covered by the exam.

6. PRACTICES

Hours: 36h

Laboratory classes: 6h

Self study: 30h

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Description:

Activity in group. This activity will be in couples and these couples will be rotating, ie, for each practice couples should be different.

Presentation of a series of programs that solve problems of medium complexity in the mathematics area. The solving process will be within and outside the classroom lab.

Support materials:

Collection of problem statements.
Laboratory manual available at Atenea.

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

For each problem there will be an online delivery which will be evaluated both in person as online, from the documentation submitted. Completion is mandatory. The whole set of problems contribute 22% in the final grade.

Specific objectives:

At the end of the activity, the student should be able to:

- Prove that he/she has achieved all of the course objectives.
- Show his/her capacity for teamwork.
- Knowing how to explain in a written or oral, the criteria applied when designing and implementing his/her project.

7. CONTROL 2

Hours: 2h
Guided activities: 2h

Description:

Individual test which includes all of the course topics, consisting of solving a number of problems by hand. The test will include some problem related with the practices.

Support materials:

Exam questions.

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

Solutions of the exam questions given by the student.
Control 2 represents 35% of the final grade.

Specific objectives:

At the end of the activity, the student must have achieved the specific objectives of topics covered by the exam.

Qualification system

AC = Grade from activities 1 and 2, all with the same weight.

QU = Grade from activity 4.

PR = Grade from activity 6.

C1 = Grade from activity 5.

C2 = Grade from activity 7.

Final Grade = $\max(50\% C2, 20\% C1 + 30\% C2) + 5\% QU + 15\% AC + 30\% PR$

The reevaluation contains the C2 test.

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- The C2 control is a global final test, weighted in the manner described.
- The re-evaluation of the subject contains the C2 test.

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Regulations for carrying out activities

Activities 1, 2, are individual and classroom activities.

Activity 4 is a series of self-assessed questionnaires that the student solves online and individually.

Activity 6 consists of several programs that solve problems of increasing difficulty must be delivered. These problems are solved in group. For each problem there is scheduled an online delivery. The teacher can ask students for an explanation of the work presented, and take into account their response to qualify the work.

Bibliography

Basic:

Franch Gutiérrez, Xavier [et al.]. Introducció a la programació : problemes resolts [on line]. Barcelona: Edicions UPC, 2006 [Consultation: 05/11/2012]. Available on: <<http://hdl.handle.net/2099.3/36697>>. ISBN 9788483018811.

Lutz, Mark. Learning Python [Recurs electrònic] [on line]. 5th ed. Sebastopol, CA: O'Reilly Media, 2013 [Consultation: 13/07/2018]. Available on: <<http://proquest.safaribooksonline.com/9781449355722?uicode=politicat>>. ISBN 9781322126661.

Others resources:

Hyperlink

<http://atenea.upc.edu/moodle/>

Notes, collection of problem statements and lab manual for the Informatics course.

http://repositori.uji.es/xmlui/bitstream/handle/10234/102653/s93_impresora.pdf

Electronic book that introduces the world of programming with Python 3

<http://www.pythontutor.com>

Resource