

## Course guide

### 330214 - I - Informatics

Last modified: 04/05/2023

**Unit in charge:** Manresa School of Engineering  
**Teaching unit:** 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

**Degree:** BACHELOR'S DEGREE IN ICT SYSTEMS ENGINEERING (Syllabus 2010). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** Catalan

#### LECTURER

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**Coordinating lecturer:** MARTA ISABEL TARRÉS PUERTAS

**Others:**

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

1. Fundamental knowledge about the use and programming of computers.
2. Operating systems, databases and computer programs with applications in engineering.

**Transversal:**

3. 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.
4. 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.
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.
6. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

#### TEACHING METHODOLOGY

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The subject is structured in two classes of two hours a week. Of these four weekly contact hours, one is dedicated to presenting the main content in an expository manner, the second to solving problems at the request of the students and the remaining two to solving practical problems in the computer laboratory.

The student is told weekly the study and problem-solving tasks that need to be done. It is advisable to carry out these jobs, at least partially, working as a team. Periodically, the progress of each individual student is evaluated.

The subject also incorporates a medium-sized program development project that must be worked on as a team.

#### LEARNING OBJECTIVES OF THE SUBJECT

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After passing this subject, the student must:

1. Know how to apply the fundamental concepts of computer programming.
2. Demonstrate skill in the use of basic programming techniques and tools.
3. Have the ability to solve problems through the development of programs of small and medium complexity.
4. Have the capacity for abstraction in the use of models to solve real problems.
5. Know how to plan oral communication, adequately answer the questions asked and write basic level texts with spelling and grammar correction.
6. Know how to identify your own information needs and use the collections, spaces and services available to design and carry out appropriate simple searches in the thematic area.
7. Be able to carry out the tasks entrusted in the scheduled time, working with the indicated sources of information, in accordance with the guidelines set by the teaching staff.



## STUDY LOAD

| Type              | Hours | Percentage |
|-------------------|-------|------------|
| Self study        | 90,0  | 60.00      |
| Hours small group | 30,0  | 20.00      |
| Hours large group | 30,0  | 20.00      |

**Total learning time:** 150 h

## CONTENTS

### (ENG) TEMA 1: Introducció a la programació

**Description:**

1. To understand how to build a program.
2. To use the necessary tools: the console, editor and compiler.
3. To understand the syntax and semantics of basic expressions and instructions in a programming language.

**Full-or-part-time:** 14h

Theory classes: 2h

Laboratory classes: 2h

Self study : 10h

### (ENG) TEMA 2: Condicionals i iteracions

**Description:**

1. To understand the syntax and semantics of conditionals and iterations.
2. To build programs using conditionals and iterations.
3. To describe the main steps in the design of iterative algorithms.
4. To use functions and actions to develop programs; to understand the concepts of function, action and parameter passing.

**Full-or-part-time:** 26h

Theory classes: 8h

Laboratory classes: 8h

Self study : 10h

### (ENG) TEMA 3: Documentació i test de programes

**Description:**

1. To implement a modular program in Python using test-drive development elegantly and in such a way that other programmers can understand what it does and modify it.
2. To understand and use doctests.
3. To write documentation that facilitates the use of a modular program written in Python by other programmers (docstrings and doctests used accordingly).

**Full-or-part-time:** 14h

Theory classes: 2h

Laboratory classes: 2h

Self study : 10h



#### (ENG) TEMA 4: Strings

**Description:**

- To design and implement algorithms using strings.
- To use index and access operators.
- To use the for iterator.
- To understand the concept of string immutability.
- To understand the main methods in string module.
- To understand the use of the official Python documentation.
- To understand predefined types in Python.

**Full-or-part-time:** 16h

Theory classes: 3h

Laboratory classes: 3h

Self study : 10h

#### (ENG) TEMA 5: Llistes

**Description:**

1. To know the data types typically used to represent and manage linear data structures.
2. To use list manipulation operators accordingly.
3. To use lists iterators.
4. To understand the concept of mutability in lists.
5. To design and implement programs using strings and lists.

**Specific objectives:**

1. To know the data types typically used to represent and manage linear data structures.
2. To use list manipulation operators accordingly.
3. To use lists iterators.
4. To understand the concept of mutability in lists.
5. To design and implement programs using strings and lists.

**Full-or-part-time:** 20h

Theory classes: 5h

Laboratory classes: 5h

Self study : 10h

#### (ENG) TEMA 6: Esquemes de tractament seqüencial

**Description:**

1. To understand and use traversal schemes with while iterations.
2. To understand and use search schemes with while iterations.
3. To use search and traversal schemes with the for operator.

**Full-or-part-time:** 14h

Theory classes: 2h

Laboratory classes: 2h

Self study : 10h



### (ENG) TEMA 7: Mòduls i fitxers

**Description:**

1. To implement functions in modules.
2. To use modules.
3. To build programs where the results are written in text files.
4. To build programs where the input data are stored in text files.
5. To build programs where the input data are provided by the command line.

**Full-or-part-time:** 16h

Theory classes: 3h

Laboratory classes: 3h

Self study : 10h

### (ENG) TEMA 8: Tuples

**Description:**

1. To understand the use of tuples.
2. To understand the concept of mutability in tuples.
3. To build list comprehensions.
4. To understand the concepts of the main sequence list, tuples and strings in Python and how they are related.

**Full-or-part-time:** 14h

Theory classes: 2h

Laboratory classes: 2h

Self study : 10h

### (ENG) TEMA 9: Diccionaris

**Description:**

1. To build programs using dictionaries in Python.
2. To understand the concept of mutability in dictionaries.
3. To develop efficient solutions to problems using dictionaries when needed.

**Full-or-part-time:** 16h

Theory classes: 3h

Laboratory classes: 3h

Self study : 10h

## ACTIVITIES

### (ENG) ACTIVITAT 1: CLASSE EXPOSITIVA

**Full-or-part-time:** 12h

Theory classes: 12h



#### (ENG) ACTIVITAT 2: CLASSE DE PROBLEMES

**Full-or-part-time:** 12h  
Theory classes: 12h

#### (ENG) ACTIVITAT 3: CLASSE DE LABORATORI

**Full-or-part-time:** 41h  
Laboratory classes: 26h  
Self study: 15h

#### (ENG) ACTIVITAT 4: ESTUDI DE CONTINGUTS

**Full-or-part-time:** 20h  
Self study: 20h

#### (ENG) ACTIVITAT 5: REALITZACIÓ D'EXERCICIS

**Full-or-part-time:** 25h  
Self study: 25h

#### (ENG) ACTIVITAT 6: PROJECTE

**Full-or-part-time:** 28h  
Theory classes: 4h  
Laboratory classes: 4h  
Self study: 20h

#### (ENG) ACTIVITAT 7: EXAMEN

**Full-or-part-time:** 12h  
Theory classes: 2h  
Self study: 10h

## GRADING SYSTEM

The qualification is made based on 3 elements:

1. The evaluation of the autonomous work of the student (A). This component contains both the progress made in the theoretical and practical aspects. To its extent, it is carried out on the basis of compulsory exercises delivered during the course.
2. The evaluation of the project (P). It is carried out from a face-to-face delivery of the course project that may involve a public presentation and the preparation of a report.
3. The final evaluation (F). It is done through a final exam that is global in nature and integrates all the knowledge and skills acquired during the course.

From these elements the final grade is calculated with the following weightings:

$$\text{Final} = 0.35A + 0.25P + 0.40F$$



## EXAMINATION RULES.

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The activities will be carried out following the uses and customs of academic work and, in particular, the following guidelines will be respected:

1. Those activities that are explicitly declared as individual, whether in person or not, will be carried out without any collaboration from other people.
2. The dates, formats and other delivery conditions that are set will be mandatory.
3. The use of the computer laboratory will be reserved exclusively for academic activities and in no case may abuse be made.

## BIBLIOGRAPHY

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### Basic:

- Downey, A. Python for software design: how to think like a computer scientist [on line]. Cambridge: Cambridge University, 2009 [Consultation: 12/11/2020]. Available on: <http://openbookproject.net/thinkcs/python/english3e/>. ISBN 9780521725965.
- Pilgrim, M. Dive into Python [on line]. New York: Apress, 2004 [Consultation: 30/10/2020]. Available on: <http://www.diveintopython3.net/>. ISBN 1590593561.
- Guzdial, M. Introduction to computing & programming in Python: a multimedia approach [on line]. 2nd ed. Upper Saddle River: Prentice-Hall, 2010 [Consultation: 31/05/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=5185706>. ISBN 9780136060239.