



Universitat de Lleida

# DEGREE CURRICULUM

# **INTRODUCTION TO**

# **PROGRAMMING II**

Coordination: GIMENO ILLA, JUAN MANUEL

Academic year 2022-23

## Subject's general information

Subject name	INTRODUCTION TO PROGRAMMING II			
Code	102001			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Computer Engineering	1	COMMON/CORE	Attendance-based
	Double bachelor's degree: Degree in Computer Engineering and Degree in Business Administration and Management	1	COMMON/CORE	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRALAB		TEORIA
	Number of credits	3		3
	Number of groups	4		2
Coordination	GIMENO ILLA, JUAN MANUEL			
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING			
Teaching load distribution between lectures and independent student work	20% on-site 20% virtual 60% autonomous work			
Important information on data processing	Consult <a href="#">this link</a> for more information.			
Language	Preferably Catalan (Spanish if any student shows difficulties with Catalan).			
Distribution of credits	Xavier Domingo (6) Juan Manuel Gimeno (9) Joan Palau (3)			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
DOMINGO ALBIN, JAVIER JUAN	xavier.domingo@udl.cat	6	By appointment
GIMENO ILLA, JUAN MANUEL	juanmanuel.gimeno@udl.cat	9	By appointment
PALAU ONCINS, JOAN	joan.palau@udl.cat	3	

## Subject's extra information

We assume the students have all the concepts of Introduction to Programming I as we build upon them into two directions: object-oriented programming and recursive design.

## Learning objectives

- To apply the Object Oriented Programming paradigm to simple problems.
- To use the basic Java file types
- To design simple recursive algorithms
- To use the Java standard documentation
- To use an Integrated Development Environment

## Competences

- **Cross-disciplinary competences**
  - **EPS1:** Capacity to solve problems and prepare and defence arguments inside the area of studies.
  - **EPS5:** Capacity of abstraction and of critical, logical and mathematical thinking.
  - **EPS9:** Capacity for unidisciplinary and multidisciplinary teamwork.
  - **EPS12:** To be motivated for the quality and steady improvement.
- **Specific competences**
  - **GII-FB3:** Capacity to understand and master the basic concepts of discrete mathematics, logical, algorithmic and computational complexity, and its application to solve engineering problems.
  - **GII-FB4:** Basic knowledge of the use and programming of computers, operating systems, databases and computer programs with applications in engineering.
  - **GII-FB5:** Knowledge of the structure, organisation, operation and interconnection of the computer systems, the basics of programming, and its application to solve engineering problems.
  - **GII-FB7:** Knowledge, design and efficient use of the types and data structure more suitable for solving a problem.
  - **GII-FB9:** Capacity to know, comprise and evaluate the structure and architecture of computers, as well as the basic components that conform them.

## Subject contents

## 1. Introduction

- 1.1 From C to Java
- 1.2 The ACM Task Force Library
- 1.3 The main program
- 1.4 Using auxiliar functions
- 1.5 Arrays in Java
- 1.6 Strings in Java

## 2. Object Oriented Programming

- 2.1 Objects and references
- 2.2 Graphic classes in the ACM library
- 2.3 The String class
- 2.4 Class definition in Java

## 3. File processing

- 3.1 Types of files
- 3.2 Sequential text files
- 3.3 Random access binary files
- 3.4 MergeSort

## 4. Recursive design

- 4.1 Function calls
- 4.2 Thinking recursively
- 4.3 Recursivity using cursors
- 4.4 Binary search
- 4.5 Multiple recursion

Software / languages / libraries:

- Java OpenJdk
- IntelliJ IDEA Community Edition
- ACM Java Task Force
- JUnit 5

## Methodology

### Big Size Groups: Theory Classes (3 credits)

- Theory: Classes supported by handnotes
- Practical application: always working on concrete examples.

### Mid Size Groups: Laboratory Classes (3 credits)

- Aimed to the resolution of practical cases by the students (there is a problems collection which includes

- exams from previous years)
- Personal tutoring of projects and difficulties.
- Use of an Integrated Development Environment.

## Autonomous Work

- Software projects are done non-presentially.
- We recommend students to solve the problems in the collection to practice and get feedback from the teaching staff.

## Development plan

Week	Big Size Group	Mid Size Group	Autonomous Work
1	Presentation + From C to Java (1 to 3)	Netbeans	Study and problem solving
2	From C to Java (rest)	Probs 3, 4 i 6	Study and problem solving
3	Introduction to OOP (1 & 2)	Probs 1, 2, 5	Study and problem solving Project 1
4	Introduction to OOP (3 & 4)	Probs 1, 2	Study and problem solving Project 1
5	Introduction to OOP (5, 6 & 7)	Probs 2, 4, 5	Study and problem solving Project 1
6	OOP Ampliation (8 & 9)	Probs 8, 9	Study and problem solving Project 2
7	OOP Ampliation (10 & 11)	Probs 10, 11, 12	Study and problem solving Project 2
8	OOP Ampliation (12 to 14)	Previous exams	Study and problem solving
9	Evaluation		
10	File management in Java (1 to 3)	Javadoc	Project 2
11	File management in Java (4 to 6)	Probs 2, 3, 4	Study and problem solving Project 2
12	File management in Java (7 & 8)	Probs 5, 6, 7	Study and problem solving Project 3
13	Recursive design (1 to 3)	Probs 8, 9 10	Study and problem solving Project 3
14	Recursive design (4 to 6)	Probs 1 i 2	Study and problem solving Project 3
15	Recursive design (9 & 10)	Probs 3, 4, 5 Previous exams	Study and problem solving
16	Evaluation		
17	Evaluation		
18	Tutorials		Study and problem solving Project 3
19	Evaluation		

- Numbers in the second column correspond to the section in the handouts of the subject.
- Those in the third to the numbers in the associated problems collection.

## Evaluation

Acr	Activity	Weight	Minimum grade to pass	Mandatory	Recoverable
Ex1	1st Midterm	20%	NO	NO	YES (its grade is only taken into account when it is greater than the second midterm)
Ex2	2nd Midterm	30%	4,0	YES	YES
Proj1	Project 1	15%	NO	NO	NO
Proj2	Project 2	20%	NO	NO	NO
Proj3	Project 3	15%	NO	NO	NO

Final Grade =  $0,25 * \text{Ex1} + 0,25 * \text{Ex2} + 0,15 * \text{Proj1} + 0,20 * \text{Proj2} + 0,15 * \text{Proj3}$

- Subject is passed if Final Grade is greater than or equal than 5
- First midterm grade is only taken into account if its greater than 2nd midterm (if not, the 2nd midterm grade is used)
- If the grade of the second midterm (or its recovery) is lower than 4, this will be the final grade, and the grades of the practices won't be taken into account.

## Bibliography

- Basic:
  - Handnotes (in spanish).
  - Eric S. Roberts, The Art & Science of Java: An Introduction to Computer Science, PearsonEducation, 2008. (hay una versión preliminar disponible en pdf).
  - Eric S. Roberts, Thinking Recursively with Java, John Wiley & Sons, 2006.
- Additional:
  - ACM Java Task Force Library Documentation <http://jtf.acm.org/>
  - [Kathy Sierra y Bert Bates. Head First Java. O'Reilly, 2003.](#)
  - Jorge A. Villalobos y Rubby Casallas, Fundamentos de Programación. Aprendizaje Activo Basado en Casos. Pearson Pentice-Hall, 2006