IDENTIFYING DATA

Programming II

Subject	Programming II
Code	V05G301V01110
Study programme	Grado en Ingeniería de Tecnologías de Telecomunicación

Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Mandatory	1st	2nd

Teaching language	#EnglishFriendly Spanish English
Department	
Coordinator	Fernández Iglesias, Manuel José Blanco Fernández, Yolanda
Lecturers	Blanco Fernández, Yolanda Busto Castiñeira, Andrea Fernández Iglesias, Manuel José Fernández Masaguer, Francisco Gil Solla, Alberto
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Web	http://moovi.uvigo.gal/
General description	The general objective of the course is to provide students with the theoretical foundations and practical skills that will allow them to analyze, design, implement and debug computer applications following the object-oriented paradigm. This is an eminently practical, student-centred course, where students have to complete several programming assignments. In order to facilitate the completion of the assignments, the course will first include a brief introduction to the discipline of Software Engineering, addressing the analysis, design, implementation and validation stages, and connecting it with the paradigm of Object Oriented Programming (OOP). The elements of OOP will then be analyzed in detail, with the help of UML elements and diagrams. English Friendly course: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

Training and Learning Results

Code	
B6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
B14	CG14 The ability to use software tools to search for information or bibliographical resources.
C50	(CE50/T18)The ability to develop, interpret and debug programs using basic concepts of Object Oriented Programming (OOP): classes and objects, encapsulation, relations among classes and objects, and inheritance.
C51	(CE51/T19) The ability of basic application of phases of analysis, design, implementation and debugging of OOP programs.
C52	(CE52/T20) The ability of manipulation of CASE tools (editors, debuggers).
C53	(CE53/T21) The ability of developing programs considering to the basic principles of software engineering quality taking into account the main existing sources of norms, standards and specifications.

Expected results from this subject

Expected results from this subject	Training and Learning Results	
To know the main UML diagrams for the documentation in the phases of analysis and design of programs according to the OOP.	B6 B14	C52 C53

To acquire maturity in techniques of development and debugging of programs to allow the autonomous learning of new skills and programming languages.	B6	C51 C52 C53
To understand the basic concepts of Object Oriented Programming (OOP).	B14	C50
To develop skills in the process of analysis, design, implementation and debugging of applications according to the OOP, taking into account the main standards and norms of quality.	B6 B14	C51 C53

Contents

Topic	
1. Introduction to the object oriented paradigm	a. Brief introduction to the subject and its organization. b. Birth of the paradigm c. Foundations: classes and objects d. Concepts of encapsulation, inheritance (generalization), and polymorphism e. Brief introduction to UML
2. Encapsulation	a. Classes, interfaces and packages b. Methods and member variables. Visibility. Scope of resolution c. Constructor method d. Parameter passing: pointers and references e. Pointers to objects f. Use of UML class diagrams.
3. Inheritance	a. Derived classes and types of inheritance b. Abstract Classes c. Multiple Inheritance d. Object class
5. Polymorphism	a. Overloading and overwriting b. Abstract classes and interfaces c. Generic classes
6. Exception handling	a. Exceptions foundations b. Handling of Java exceptions
(*)Contidos prácticos.	(*)As prácticas propostas permitirán combinar a aplicación dos conceptos de POO explorados nas sesións teóricas co manexo de estruturas de datos e o desarrollo de lóxica algorítmica.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	25	35	60
Practices through ICT	8	20	28
Practices through ICT	9	20	29
Practices through ICT	9	19	28
Essay questions exam	1.5	0	1.5
Essay questions exam	1.5	0	1.5
Essay questions exam	2	0	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Classes involving explanation of OOP-related concepts and resolution of practical exercises. Through this methodology the competencies C50, C51 and C53 are developed.
Practices through ICT	Students will solve independently the assignments proposed. The solutions and doubts that arise when dealing with these assignments will be discussed in order to identify the most common mistakes made. Through this methodology the competencies C50, C51, C52, C53, B6 and B14 are developed.
Practices through ICT	Students will solve independently the assignments proposed. The solutions and doubts that arise when dealing with these assignments will be discussed in order to identify the most common mistakes made. Through this methodology the competencies C50, C51, C52, C53, B6 and B14 are developed.
Practices through ICT	Students will solve independently the assignments proposed. The solutions and doubts that arise when dealing with these assignments will be discussed in order to identify the most common mistakes made. Through this methodology the competencies C50, C51, C52, C53, B6 and B14 are developed.

Personalized assistance

Methodologies	Description
Lecturing	Lecturers will solve the doubts raised by the students in relation to the concepts exposed in the lectures. Students may consult and request mentoring sessions through the Moovi platform (https://moovi.uvigo.gal).
Practices through ICT	Lecturers will supervise the level of understanding of the students, assisting them with doubts, design errors and improvements at the object-oriented code level. The Students may consult and request mentoring sessions through the Moovi platform (https://moovi.uvigo.gal).
Practices through ICT	Lecturers will supervise the level of understanding of the students, assisting them with doubts, design errors and improvements at the object-oriented code level. The Students may consult and request mentoring sessions through the Moovi platform (https://moovi.uvigo.gal).
Practices through ICT	Lecturers will supervise the level of understanding of the students, assisting them with doubts, design errors and improvements at the object-oriented code level. The Students may consult and request mentoring sessions through the Moovi platform (https://moovi.uvigo.gal).

Assessment

	Description	Qualification	Training and Learning Results
Practices through ICT	This is the first lab deliverable (hereinafter, E1). Students will be able to correct errors identified and retry the assessments, with a possible penalty, until a date to be determined (around mid-April). Once E1 assignments are graded, they will be uploaded to MOOVI, to check plagiarism.	10	B6 C50 B14 C51 C52 C53
Practices through ICT	This is the second lab deliverable (hereinafter, E2). Students will be able to correct errors identified and retry the assessments, with a possible penalty, until the latest date allowed by academic regulations and course organization requirements (actual date to be notified in due time). Once E2 assignments are graded, they will be uploaded to MOOVI, to check plagiarism.	15	B6 C50 B14 C51 C52 C53
Practices through ICT	Students will upload E3 assignments to MOOVI. E3 assignments will be graded by course lecturers outside lab sessions.	25	B6 C50 B14 C51 C52 C53
Essay questions exam	Each student will take, individually and without any kind of support material, an exam at the end of the term on the totality of the contents covered in the course. The maximum grade for this exam will be 3 points (out of 5) for students who sit continuous assessment, and 5 points for those students who choose the global assessment.	30	C50 C51 C53
Essay questions exam	Each student will take (individually and without any type of material of support) a test on the date the will be approved by CAG (approximately half of the academic period) on the contents that were explained up to one week before the exam. This test will be carried out only by students who sit continuous assessment, and the maximum grade will be 2 points (out of 5 points).	20	C50 C51 C53
Essay questions exam	This exam will be sit by students who opt for continuous evaluation and have submitted E3. In addition, the lab exam will be compulsory in the global evaluation of the ordinary call, in the extraordinary one and in the end-of-studies exam.	0	C50 C51 C53

Other comments on the Evaluation

There are two assessment mechanisms, continuous assessment (CA) and global assessment (GA), which must be chosen by the students considering the following conditions:

- Both the classroom and lab parts will be evaluated according to the same mechanism, CA or GA, as selected by the student.
- CA includes the exams described in the previous section: two theory exams, design and development of Java assignments collected in deliverables E1, E2 & E3, and a lab exam if E3 is submitted.
- Students will confirm the final evaluation modality (CA or GA) when submitting lab deliverables, depending on the submission date. The chosen evaluation modality will also be applied to the theory/classroom part. Therefore, in the case that a student finally chooses GA, the grade of the first classroom exam, if any, would be discarded.
- Regardless of the chosen evaluation modality, lab assignments will always be carried out individually.
- A minimum grade of 2 points (out of 5) in both theory/classroom and lab parts is required to pass the course.

- If the grade resulting from adding the classroom and lab grades is equal or higher than 5 points, but the student does not reach the minimum grade required in any of them, his/her final grade will be Fail (4.5).
- If a student attends any of the evaluation tests of the course, he/she will not be able to appear in transcripts as "no-show".
- The CA tests will only take place on the dates established by the teachers, and cannot be resit or delayed.
- Plagiarism is regarded as serious dishonest behavior. If any form of plagiarism is detected in any of the tests or exams, the final grade will be *Fail(0)*, and the incident will be reported to the corresponding academic authorities for prosecution.

Assessment procedure for the ordinary call for students who opt for Continuous Assessment (CA)

- **Theory/classroom part (50%)**: The grade of this part (5 points) is obtained by adding the corresponding grades of the two classroom exams (midterm and end-of-semester), with maximum grades of 2 and 3 points, respectively.
- **Lab part (50%)**: The grade for this part depends on the grades obtained in each of E1, E2 & E3 deliverables (up to 5 points in total). Students submitting E3 will have to sit a pass/fail lab exam. In case this exam is failed, the E3 grade will be 0 points.

Students who do not pass the course in the ordinary opportunity, may keep the grade obtained in both theory and lab for the extraordinary opportunity, as long as they have achieved the minimum grade required in the part they wish to keep (2 points out of 5, in both cases).

Assessment procedure for the ordinary call for students who opt for Global Assessment (GA):

- **Classroom part (50%)**: The grade of this part (5 points) corresponds to an individual exam without any type of supporting material at the end of the academic semester (on the date approved by the school).
- **Lab part (50%)**: The grade for this part depends on the grades obtained in deliverables E1, E2 and E3 (up to 5 points in total) and the result of a practical exam. The deliverables may be identical to those required in CA or include modifications in the functionalities to be developed. They will be delivered through Moovi and will be evaluated by lecturers outside lab sessions. The student must pass a practical exam in which a modification of E2 or E3 will be required (depending on the specific deliverables submitted for assessment). In case of not passing it (i.e., Fail grade), the grade of the corresponding deliverable will be 0 points.

Assessment procedure for the extraordinary call and end-of-program call:

- **Classroom part (50%)**. Individual exam on the date to be approved by the school, requiring a minimum grade of 2 points (out of 5).
- **Lab part (50%)**. The corresponding E1, E2 and E3 deliverables must be uploaded to Moovi and a lab exam must be sit. Assignments may be the same CA/GA assignments or may include modifications in functionality and/or scoring. As there is no CA, assessment procedures are the same as as ordinary call's GA.

Sources of information
Basic Bibliography
Yolanda Blanco Fernández, **Introducción a Programación Orientada a Objetos**, 1ª edición, Andavira, 2019
W. Savitch, **Absolute Java**, 6ª edición, Pearson, 2015
Y. D. Liang, **Introduction to Java programming**, 8ª, Pearson, 2010
P. Deitel, H. Deitel, **Java: How to program**, 11, Pearson, 2017
Complementary Bibliography
B. Eckel, **Thinking in Java**, 4ª edición, Prentice-Hall, 2006
P. Niemeyer, D. Leuck, **Learning Java**, 4ª edición, O'Reilly., 2013
Oracle, **Java SE. Oracle**,
Oracle, **Java API Specifications**, 2022
G. Booch, J. Rumbaugh, I. Jacobson, **The Unified Modeling Language User Guide**, 2, Addison-Wesley., 2005
S. Zakhour, S. Hommel, J. Royal, I. Rabinovitch, T. Risser, M. Hoeber, **The Java Tutorial. A short course on the basics**, 6ª edición, Prentice-Hall, 2014
A. Eberhart, S. Fischer, **Java Tools**, Wiley, 2002
M. Page-Jones, **Fundamentals of object-oriented design in UML**, Addison-Wesley, 2002
M. Fowler, **UML Distilled: A Brief Guide to the Standard Object Modeling Language**, 3ª edicion, Addison-Wesley., 2003

Recommendations

Subjects that it is recommended to have taken before

Programming I/V05G301V01105