Universidad de Alcalá

TEACHING GUIDE

Advanced Programming

Degree in
Telecommunication Technologies Engineering (GITT)

Universidad de Alcalá

Academic Year 2024/2025

4th Year - 1st Semester (GITT)

TEACHING GUIDE

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Course Name:	**Advanced Programming**
Code:	**350041 (GITT)**
Degree in:	**Telecommunication Technologies Engineering (GITT)**
Department and area:	**Ciencias de la Computación** **Arquitectura y Tecnología de Computadores**
Type:	**Optional (Specialized) (GITT)**
ECTS Credits:	**6.0**
Year and semester:	**4th Year - 1st Semester (GITT)**
Teachers:	María Dolores Rodríguez Moreno
Tutoring schedule:	Consultar al comienzo de la asignatura
Language:	Spanish/English Friendly

1. COURSE SUMMARY

This course addresses the programming paradigm that uses objects and their interactions to design applications and computer programs. The result is what we know as object-oriented programming (OOP). It is highly recommended that applicants have completed both courses: Computing Systems and Programming prior to attending this class.

2. SKILLS

Basic, Generic and Cross Curricular Skills.

This course contributes to acquire the following basic, generic and cross curricular skills:

Specific Skills

This course contributes to acquire the following specific skills:

en_CT7 - Knowledge and use of the essentials of programming in networks, systems and services of telecommunication.

Professional Competencies

This course provides the following professional competence(s) defined in section 5 of the Annex to Order CIN/352/2009:

CTE7 - Ability to program networked and distributed telematic services and applications.

Learning Outcomes

Upon successful completion of this course, students will be able to:

RA1. Describe the differences between the OOP paradigm and others.

RA2. Design, from the textual specification of a problem a set of related classes whose interaction provides a solution to the said problem.

RA3. Build OO programs using a specific programming language.

3. CONTENTS

Contents Blocks	Total number of hours
General concepts of OOP Differences between OOP and structured programming. Introduction to OOP elements. Language elements.	8 T + 8 P hours
Classes and operator overloading Concept of classes, objects, methods, and attributes. Encapsulation, inheritance, and polymorphism. Operator overloading. Data structure. Modules.	14 T + 14 P hours
Generic programming Generic classes to create flexible data structures.	2 T + 2 P hours
Exceptions and flows Concepts of exceptions. Creation of custom exceptions. Working with files.	4 T + 4 P hours

4. TEACHING - LEARNING METHODOLOGIES. FORMATIVE ACTIVITIES.

4.1. Credits Distribution

Number of on-site hours:	58 hours (56 hours on-site +2 exams hours)
Number of hours of student work:	92 hours (Includes study hours, preparation of activities, preparation of exams)
Total hours	150

4.2. Methodological strategies, teaching materials and resources

The course contents previously described shall be taught in the following ways:

- Theoretical exposition with slides and demonstrations with the computer.
- Group problem-solving and individual practice resolutions and assignments by each student.
- Student presentations.

5. ASSESSMENT: procedures, evaluation and grading criteria

Preferably, students will be offered a continuous assessment model that has characteristics of formative assessment in a way that serves as feedback in the teaching-learning process.

5.1. PROCEDURES

The evaluation must be inspired by the criteria of continuous evaluation (Learning Assesment Guidelines, LAG, art 3). However, in compliance with the regulations of the University of Alcalá, an alternative process of final evaluation is made available to the student in accordance with the Learning Assesment Guidelines as indicated in Article 10, students will have a period of fifteen days from the start of the course to request in writing to the Director of the Polytechnic School their intention to take the non-continuous evaluation model adducing the reasons that they deem convenient. The evaluation of the learning process of all students who do not apply for it or are denied it will be done, by default, according to the continuous assessment model. The student has two calls to pass the subject, one ordinary and one extraordinary.

5.2. EVALUATION

EVALUATION CRITERIA

The assessment criteria measure the level at which the competencies have been acquired by the student. For that purpose, the following are defined:

CE1. The student identifies the main concepts and ideas of object-oriented programming.

CE2. The student associates and applies the main concepts and ideas of classes, operator overloading, derived classes, and polymorphism.

CE3. The student distinguishes and applies the main concepts and ideas of generic programming.

CE4. The student understands and applies exceptions and flows' main concepts and ideas.

CE5. The student integrates and applies the contents to the OOP developed.

EVALUATION INSTRUMENTS

The evaluation instruments for ordinary and extraordinary calls are specified below.

Ordinary call: continuous assessment/final exam

Continuous assessment will consist of two parts:

1. Practical exercises and/or intermediate exams: 60% of the final grade.

    The total number of activities proposed in this block will be communicated to the student during the

introductory class. These activities include:

Carrying out and evaluating practical exercises.
Evaluation of theoretical concepts and problems posed on them.
Two laboratory tests (PL) and one intermediate evaluation test (PEI) are planned. The duration of each will not exceed the duration of a class session. These tests will be carried out during practical or theoretical hours, so they will not require extra time.
The evaluation of each practical case includes the practical (PL) to be carried out and the related theory (T).

2. Carrying out a theoretical-practical final exam (PEF) at the end of the teaching period: 40% of the final grade. The duration of this exam will be approximately 2 hours.

In addition, the student must submit the practical exercises on the established date for each of them in a schedule provided at the beginning of the course. The deadline to submit a practical exercise will be exactly one week after the established submission date, in which case a penalty of 50% will be applied to the grade obtained in its evaluation. Exercises submitted after the deadline will be graded with 0 points. Submissions of practices, unless expressly indicated otherwise, will be carried out exclusively within the assigned laboratory group.

A student who has not taken any of the partial tests associated with the evaluation of laboratory practices will be considered as not presented.

Assessment through a final exam:

The final exam will consist of a single test on theoretical-practical contents that will constitute 100% of the course grade.
Students who have been granted evaluation through the final exam will have the right to take this exam. The exam may be conducted orally and/or in writing.
The theoretical-practical contents include the practices from the subject's practice schedule. All practices submitted outside the established schedule will carry the penalty described in point 2 of continuous evaluation.

Extraordinary call: final exam

Students who have not passed the subject in the ordinary call may opt for another extraordinary call consisting of a single test on theoretical-practical contents that will constitute 100% of the subject grade. The exam may be conducted orally and/or in writing.

The theoretical-practical contents include the practical assignments from the course.

GRADING CRITERIA

In the ordinary call-continuous assessment the relationship between the competences, learning outcomes, criteria and evaluation instruments is as follows.

Skills	Learning Outcomes	Evaluation criteria	Grading Tool	Contribution to the final mark
CTE7	RA1	CE1, CE2, CE5	PEI1:PL1-PL2,T	15%
	RA2-RA3	CE2, CE5	PEI2: PL3-PL5, T	22,5%
			PEI3: PL6, T	7,5%
			PEI4: PL7, T	7,5%
		CE3, CE4, CE5	PEI5: PL8, T	7,5%
		CE1-CE5	PEF: PL1-PL8, T	40%

In the ordinary call-final - final exam or the extraordinary call - the relationship between the competences, learning outcomes, criteria, and evaluation instruments is as follows.

Skills	Learning Outcomes	Evaluation criteria	Grading Tool	Contribution to the final mark
	RA1-RA3	CE1-CE5	PEF: PL1-PL8	50%
	RA1-RA3	CE1-CE5	PEF: T	50%

Extraordinary call

In the case of the extraordinary call, the same percentages that have been established in the case of the evaluation by means of a final exam will be maintained, giving the option of making the PL or maintaining the mark obtained in the EL (continuous evaluation) or in the PEF (final evaluation), according to the student's decision. In any case, the PL will be made by those students who have not done it in the final exam option in the ordinary call.

6. BIBLIOGRAPHY

6.1. Basic Bibliography

- Object Oriented Programming with Python for Beginners: Mastering the Foundations of OOP. From Principles to Practice. 2 in 1 Guide. Autor: SAM CAMPBELL

6.2. Additional Bibliography

- Lenguajes de programación. Diseño e Implementación. Terence W.Pratt. Marvin V. Zelkowitz. Prentice Hall.

Disclosure Note

During the evaluation tests, the guidelines set out in the Regulations establishing the Rules of Coexistence of the University of Alcalá must be followed, as well as the possible implications of the irregularities committed during said tests, including the consequences for committing academic fraud according to the Regulation of Disciplinary Regime of the Students of the University of Alcalá.