# UNIVERSIDAD DE CASTILLA - LA MANCHA
## GUÍA DOCENTE

## 1. General information

**Course:** PROGRAMMING METHODOLOGY
**Type:** CORE COURSE
**Degree:** 405 - DEGREE IN COMPUTER SCIENCE ENGINEERING (TA)
**Center:** 15 - FACULTY OF SOCIAL SCIENCES AND INFORMATION TECHNOLOGIES
**Year:** 2
**Main language:** Spanish
**Use of additional languages:**
**Web site:**

**Code:** 42316
**ECTS credits:** 6
**Academic year:** 2022-23
**Group(s):** 60
**Duration:** C2
**Second language:** Spanish
**English Friendly:** Y
**Bilingual:** N

Lecturer: **ROBERTO SOBRINOS SÁNCHEZ** - Group(s): **60**

| Building/Office | Department | Phone number | Email | Office hours |
|---|---|---|---|---|
| | TECNOLOGÍAS Y SISTEMAS DE INFORMACIÓN | | Roberto.Sobrinos@uclm.es | |

## 2. Pre-Requisites

This course is based on the competencies and knowledge obtained in the previous courses:

- Programming Fundamentals I
- Programming Fundamentals II
- Calculus and Numerical Methods
- Algebra and Discrete Mathematics
- Logic
- Data Structures

As a general suggestion it is strongly recommended:

- To know how to determine the roots of polynomials, limits, and sum of series
- To have a good programming level either for iterative or recursive code
- To know and handle efficiently the data structures introduced in previous courses

## 3. Justification in the curriculum, relation to other subjects and to the profession

This course is integrated into the "Programming" subject within the common Module of the Computer Science branch of the "Grado en Ingeniería Informática". The
course provides the basis for solving real and complex problems. Therefore, the course is key to later years courses, especially to

- Design of algorithms
- Software Engineering
- Intelligent systems

## 4. Degree competences achieved in this course

### Course competences

| Code | Description |
|---|---|
| BA03 | Ability to understand basic concepts about discrete mathematics, logic, algorithms, computational complexity, and their applications to solve engineering problems. |
| CO06 | Knowledge and application of basic algorithms in digital technologies for the development of solutions, analysing their appropriateness and complexity. |
| CO07 | Knowledge, design, and efficient use of types of data and structures which arise as most appropriate in problem solving. |
| INS01 | Analysis, synthesis, and assessment skills. |
| INS04 | Problem solving skills by the application of engineering techniques. |
| PER01 | Team work abilities. |
| PER02 | Ability to work in an international context. |
| PER04 | Interpersonal relationship skills. |
| PER05 | Acknowledgement of human diversity, equal rights, and cultural variety. |
| SIS01 | Critical thinking. |
| SIS03 | Autonomous learning. |
| UCLM02 | Ability to use Information and Communication Technologies. |

## 5. Objectives or Learning Outcomes

### Course learning outcomes

Description
Resolution of problems throughout basic techniques of algorithm design.

Design of solutions for problems by the analysis of appropriateness and complexity of suggested algorithms.

**Additional outcomes**

## 6. Units / Contents

**Unit 1: Algorithm Analysis**

**Unit 2: Divide and Conquer algorithms**

**Unit 3: Greedy Algorithms**

**Unit 4: Backtracking Algorithms**

## 7. Activities, Units/Modules and Methodology

| Training Activity | Methodology | Related Competences (only degrees before RD 822/2021) | ECTS | Hours | As | Com | Description |
|---|---|---|---|---|---|---|---|
| Class Attendance (theory) [ON-SITE] | Lectures | BA03 CO06 CO07 | 0.72 | 18 | N | - | Teaching of the subject matter by lecturer |
| Individual tutoring sessions [ON-SITE] | | BA03 CO06 CO07 UCLM02 | 0.18 | 4.5 | N | - | Individual or small group tutoring in lecturer¿s office, classroom or laboratory |
| Study and Exam Preparation [OFF-SITE] | Self-study | BA03 CO06 CO07 SIS01 SIS03 | 2.1 | 52.5 | N | - | Self-study |
| Other off-site activity [OFF-SITE] | Practical or hands-on activities | BA03 CO06 CO07 INS01 INS04 PER01 PER02 PER04 PER05 SIS03 | 0.6 | 15 | N | - | Lab practical preparation |
| Problem solving and/or case studies [ON-SITE] | Problem solving and exercises | BA03 CO06 CO07 INS04 PER01 PER02 PER04 PER05 SIS01 SIS03 UCLM02 | 0.6 | 15 | Y | N | Worked example problems and cases resolution by the lecturer and the students |
| Writing of reports or projects [OFF-SITE] | Self-study | BA03 CO06 CO07 INS01 INS04 PER02 PER04 PER05 | 0.9 | 22.5 | Y | N | Preparation of essays on topics proposed by lecturer |
| Laboratory practice or sessions [ON-SITE] | Practical or hands-on activities | BA03 CO06 CO07 INS04 PER01 PER02 PER04 PER05 | 0.6 | 15 | Y | Y | Realization of practicals in laboratory /computing room |
| Final test [ON-SITE] | Assessment tests | BA03 CO06 CO07 INS01 INS04 PER01 PER02 | 0.3 | 7.5 | Y | Y | Final exam including all topics |
| | | **Total:** | **6** | **150** | | | |
| **Total credits of in-class work: 2.4** | | | | **Total class time hours: 60** | | | |
| **Total credits of out of class work: 3.6** | | | | **Total hours of out of class work: 90** | | | |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

## 8. Evaluation criteria and Grading System

| Evaluation System | Continuous assessment | Non-continuous evaluation* | Description |
|---|---|---|---|
| Final test | 50.00% | 50.00% | Compulsory activity that can be retaken (rescheduling) to be carried out within the planned exam dates of the final exam call (convocatoria ordinaria) |
| Theoretical papers assessment | 15.00% | 15.00% | Non-compulsory activity that can be retaken. To be carried out before end of teaching period |
| Laboratory sessions | 25.00% | 25.00% | Compulsory activity that can be retaken. To be carried out during lab sessions |
| Assessment of active participation | 10.00% | 10.00% | Non-compulsory activity that can be retaken. To be carried out during the theory/lab sessions by the continuous assesment students. Non-continuous evaluation students will be evaluated with an alternative system. |
| **Total:** | **100.00%** | **100.00%** | |

*According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).*

**Evaluation criteria for the final exam:**

**Continuous assessment:**

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The evaluation of the activities will be global and therefore must be quantified by means of a single mark. If the activity consists of several sections, each section may

be evaluated separately provided students are informed in writing of this evaluation criterion at the beginning of the academic year. In the case of the activities

that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).

The final exam will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each

part of the final exam will be evaluated by the same lecturer for all the students.

A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable

activities, and also have passed all the compulsory activities.

For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake exam call (convocatoria extraordinaria). If an activity is not recoverable, its assessment will be preserved for the resit/retake exam call (convocatoria extraordinaria) even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those
activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the last grade obtained.

The mark of the passed activities in any call, except for the final exam, will be conserved for the subsequent academic year at the request of the student, provided
that mark is equal or greater than 50% and that the activities and evaluation criteria of the subject remain unchanged prior to the beginning of that academic year.

The failure of a student to attend the final exam will automatically result in her/him receiving a "Failure to attend¿ (no presentado). If the student has not passed
any compulsory evaluation activity, the maximum final grade will be 40%

**Non-continuous evaluation:**

Students who are unable to attend training activities on a regular basis may apply at the beginning of the semester for the non-continuous assessment mode. Similarly, if a student who is undergoing continuous assessment incurs any circumstance that prevents her/him from regularly attending the classroom-based training activities, she/he may renounce the accumulated mark in continuous assessment and apply for the non-continuous assessment mode.

In the same way, the student may change to the non-continuous evaluation mode as long as she/he has not participated during the teaching period in evaluable activities that together account for at least 50% of the total mark of the subject. If a student has reached this 50% of the total obtainable mark, or the teaching period is over, she/he will be considered in continuous assessment without the possibility of changing to non-continuous evaluation mode.

Students who take the non-continuous assessment mode will be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences), through the assessment systems indicated in the column "Non-continuous assessment".

In the "non-continuous assessment" mode, it is not compulsory to keep the mark obtained by the student in the activities or tests (progress test or partial test) taken in the continuous assessment mode.

**Specifications for the resit/retake exam:**

Evaluation tests could be conducted for all evaluable activities

**Specifications for the second resit / retake exam:**

Same characteristics as the resit/retake exam call.

## 9. Assignments, course calendar and important dates

**Not related to the syllabus/contents**

| Hours | hours |
| --- | --- |

**General comments about the planning:** The subject is taught in 3 x 1,5 hour sessions per week. The planning can be modified in the event of unforeseen causes.

## 10. Bibliography and Sources

| Author(s) | Title/Link | Publishing house | City | ISBN | Year | Description |
| --- | --- | --- | --- | --- | --- | --- |
| T Cormen, C Leiserson, R Rivest and C Stein | Introduction to Algorithms | MIT Press | Cambridge, MA, USA | 978-0262533058 | 2009 | |
| | https://mitpress.mit.edu/books/introduction-algorithms | | | | | |
| José Luis Verdegay Galdeano | Lecciones de Algorítmica | Editorial Técnica Avicam | | 978-8416535897 | 2017 | |
| R. Sedgewick, K. Wayne | Algorithms, 4th Edition | Addison-Wesley | New Jersey, USA | 978-0321573513 | 2011 | |
| | http://algs4.cs.princeton.edu/home/ | | | | | |
| Michael T. Goodrich , Roberto Tamassia , Michael H. Goldwasser | Data Structures and Algorithms in Java - 6th Edition International Student Version | John Wiley & Sons Inc | | 978-1118808573 | 2014 | |