Nota de traducción académica / Academic Translation Note

ES

El presente documento constituye una traducción académica literal al inglés de las Guías Docentes oficiales (*Guías Docentes*) del Máster XXXXXX de la Universidad de Burgos, correspondientes al curso académico 2025–2026.

La traducción se ha realizado siguiendo criterios académicos e institucionales, respetando fielmente la estructura, contenidos, competencias, resultados de aprendizaje, sistemas de evaluación y distribución de créditos ECTS de los documentos originales en lengua española. En caso de discrepancia interpretativa, la versión original en español prevalecerá a efectos académicos, administrativos y legales.

EN

This document is an academic-literal English translation of the official Course Guides (*Guías Docentes*) of the Master's Degree in XXXXXX, University of Burgos, for the academic year 2025–2026.

The translation has been carried out following academic and institutional criteria, faithfully preserving the structure, contents, competencies, learning outcomes, assessment systems and ECTS credit distribution of the original Spanish documents. In the event of any discrepancy, the original Spanish version shall prevail for academic, administrative and legal purposes.

Contents

COURSE GUIDE 2025–2026 — CODE 9102

ADVANCED COMPUTER ARCHITECTURES

DEGREE PROGRAMME:

Master's Degree in Computer Engineering

ECTS CREDITS:

6

COMPETENCES:

Design and evaluate operating systems and servers, as well as applications and systems based on distributed computing.

Apply advanced knowledge of high-performance computing and numerical or computational methods to engineering problems.

Plan, calculate and design products, processes and installations in all areas of computer engineering.

Direct works and installations of computer systems, complying with current regulations and ensuring quality of service.

Analyse and synthesise information related to needs, problems and solutions for the preparation, presentation and defence of activities, reports and technical documents in computer engineering.

Organise and plan the execution, presentation and defence of practical activities, assignments and projects in computer engineering.

Manage information for the development, presentation and defence of deliverables, activities, practical work, assignments and projects in any area of computer engineering.

Identify, analyse and solve general problems in computer engineering through exercises, questionnaires and practical activities, integrating and applying the necessary knowledge and tools for their resolution and validation.

Work in teams in the resolution of problems and in the development, presentation and defence of reports and documents required in academic and professional activities.

Apply critical reasoning when selecting and applying the most appropriate concepts, methods and techniques for solving and defending activities, problems, assignments and projects in different areas of computer engineering.

Learn autonomously, organising and planning one's own study and work in order to act independently, demonstrating self-organisation, initiative, responsibility and capacity for lifelong learning and continuous professional development.

Adapt to new situations by analysing and evaluating new contexts in problem-solving, integrating knowledge from specific areas of computer engineering and applying it to new situations.

LEARNING OBJECTIVES:

To evaluate different concurrent architectures.

To analyse and evaluate parallelism in multicore devices.

To apply different programming strategies depending on the hardware in MIMD machines.

To manage MIMD machines (Multiple Instruction Multiple Data).

To analyse, design and evaluate the subsystems that make up servers and supercomputers.

To analyse, design and evaluate servers and supercomputers according to their intended use.

COURSE UNITS:

Servers.

Servers and supercomputers.

Storage systems.

Interconnection networks.

Energy management.

Microsoft HPC.

Installation of an HPC cluster.

Operation management.

Job scheduling.

Multicore devices.

Parallelism in multicore devices.

Multicore processors.

Cache coherence in multicore devices.

Examples of multicore devices.

Performance evaluation.

Benchmarks.

Performance evaluation in data centres.

Performance evaluation in supercomputers.

Benchmark examples.

Emerging architectures.

Quantum computers.

Practical activities.

Parallel programming practices.

Advanced MPI concepts.

Performance evaluation.

Shared memory programming.

Basic OpenMP concepts.

Performance evaluation.

Hybrid programming.

Basic hybrid programming concepts.

Performance evaluation.

TEACHING METHODOLOGY:

Video tutorials of the course topics.

Participation in forums and consultation of materials.

Programming practice activities.

Completion of assignments, reports and assessment tests.

ASSESSMENT SYSTEM:

Assessment in the first and second sittings will be based on the following procedures and weightings.

Presentation: 10 percent in the first sitting and 10 percent in the second sitting.

Submission of an individual assignment: 10 percent in the first sitting and 10 percent in the second sitting.

Submission of a group assignment: 10 percent in the first sitting and 10 percent in the second sitting.

Participation in forums: 20 percent in the first sitting and 20 percent in the second sitting.

Submission of practical reports (ten reports, each worth five percent): 50 percent in the first sitting and 50 percent in the second sitting.

The total weighting of all assessment procedures is one hundred percent in both sittings.

LANGUAGE OF INSTRUCTION:

Spanish