

# Guía docente

## 300105 - NETARCH - Arquitectura de Red

Última modificación: 07/10/2025

**Unidad responsable:** Escuela de Ingeniería de Telecomunicación y Aeroespacial de Castelldefels  
**Unidad que imparte:** **Titulación:** MÁSTER UNIVERSITARIO EN INTELIGENCIA ARTIFICIAL PARA INDUSTRIAS CONECTADAS (AI4CI) (Plan 2025). (Asignatura optativa).

**Curso:** 2025      **Créditos ECTS:** 6.0      **Idiomas:** Inglés

### PROFESORADO

**Profesorado responsable:** Michele Pagano (Università di Pisa)

**Otros:** Michele Pagano (Università di Pisa)  
Enrica Zola (UPC)

### CAPACIDADES PREVIAS

The concepts related to networking in general are introduced during the course; however, a basic knowledge about computer programming and cryptography might be useful

### REQUISITOS

The concepts related to networking in general are introduced during the course; however, a basic knowledge about computer programming and cryptography might be useful

### METODOLOGÍAS DOCENTES

On-line lectures  
Autonomous laboratory sessions

### OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

The aim of the course is twofold: on one side it provides an introduction to the general principles of networking and an overview of the main protocols of the TCP/IP stack, on the other side more advanced topics involving the evolution of network and transport layer protocols are presented.

At the end of the course the student will be able to understand the working principles of Internet, will know the main protocols of the TCP/IP stack and will be able to use Wireshark for network traffic analysis.

### HORAS TOTALES DE DEDICACIÓN DEL ESTUDIANTADO

Tipo	Horas	Porcentaje
Horas aprendizaje autónomo	96,0	64.00
Horas grupo grande	54,0	36.00

**Dedicación total:** 150 h



## CONTENIDOS

### Introduction to Computer Networks and the Internet

**Descripción:**

- Architectural elements and standardization bodies
- Packet switching vs. circuit switching
- Protocol layers and their service models
- Delay, loss, and throughput in packet-switched networks

**Dedicación:** 25h

Grupo grande/Teoría: 9h

Aprendizaje autónomo: 16h

### Application Layer

**Descripción:**

- Principles of network applications
- The Web and HTTP
- DNS: basic mechanism and security-oriented evolution

**Dedicación:** 25h

Grupo grande/Teoría: 9h

Aprendizaje autónomo: 16h

### Transport Layer

**Descripción:**

- Transport-layer services and protocols
- Connectionless transport: UDP
- Connection-oriented transport: TCP
- TCP congestion control: Reno, Cubic, linux TCP variants
- Evolution of transport-layer functionality: QUIC, HTTP/3

**Dedicación:** 44h 30m

Grupo grande/Teoría: 16h

Aprendizaje autónomo: 28h 30m

### Network layer: Data plane

**Descripción:**

- Forwarding and routing: the data and control planes
- IPv4 datagram format
- IPv4 addressing
- IPv6 and IPsec

**Dedicación:** 19h 30m

Grupo grande/Teoría: 7h

Aprendizaje autónomo: 12h 30m



### Network layer: Control plane

**Descripción:**

- Routing algorithms: Link-State vs. Distance-Vector
- Intra-AS routing in the Internet: OSPF
- Routing among the ISPs: BGP
- ICMP – labs on traceroute and ping

**Dedicación:** 14h

Grupo grande/Teoría: 5h

Aprendizaje autónomo: 9h

### Software tools

**Descripción:**

- Network-related Linux utilities
- Packet sniffers and analyzers: wireshark and tshark
- Network simulation
- Data processing utilities

**Dedicación:** 22h

Grupo pequeño/Laboratorio: 8h

Aprendizaje autónomo: 14h

## SISTEMA DE CALIFICACIÓN

The exam consists of an oral test (that includes an interview on theoretical topics and a practical test on traffic analysis) and/or written exam (50%), questionnaires (20%), and evaluation of lab reports/assignments (30%)

## BIBLIOGRAFÍA

**Básica:**

- Kurose, James F; Ross, Keith W. Computer networking : a top-down approach . Global edition. ©2022. ISBN 9781292405469.

## RECURSOS

**Otros recursos:**

Provided in the Moodle platform