

Guia docent

300105 - NETARCH - Arquitectura de Xarxa

Última modificació: 07/10/2025

Unitat responsable: Escola d'Enginyeria de Telecomunicació i Aeroespacial de Castelldefels
Unitat que imparteix: **Titulació:** MÀSTER UNIVERSITARI EN INTEL·LIGÈNCIA ARTIFICIAL PER A INDÚSTRIES CONNECTADES (AI4CI) (Pla 2025). (Assignatura optativa).
Curs: 2025 **Crèdits ECTS:** 6.0 **Idiomes:** Anglès

PROFESSORAT

Professorat responsable: Michele Pagano (Università di Pisa)
Altres: Michele Pagano (Università di Pisa)
Enrica Zola (UPC)

CAPACITATS PRÈVIES

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

REQUISITS

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METODOLOGIES DOCENTS

On-line lectures
Autonomous laboratory sessions

OBJECTIUS D'APRENTATGE DE L'ASSIGNATURA

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.

HORES TOTS DE DEDICACIÓ DE L'ESTUDIANT

Tipus	Hores	Percentatge
Hores aprenentatge autònom	96,0	64.00
Hores grup gran	54,0	36.00

Dedicació total: 150 h

CONTINGUTS

Introduction to Computer Networks and the Internet

Descripció:

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

Dedicació: 25h

Grup gran/Teoria: 9h

Aprentatge autònom: 16h

Application Layer

Descripció:

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

Dedicació: 25h

Grup gran/Teoria: 9h

Aprentatge autònom: 16h

Transport Layer

Descripció:

- 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

Dedicació: 44h 30m

Grup gran/Teoria: 16h

Aprentatge autònom: 28h 30m

Network layer: Data plane

Descripció:

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

Dedicació: 19h 30m

Grup gran/Teoria: 7h

Aprentatge autònom: 12h 30m



Network layer: Control plane

Descripció:

- 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

Dedicació: 14h

Grup gran/Teoria: 5h

Aprenentatge autònom: 9h

Software tools

Descripció:

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

Dedicació: 22h

Grup petit/Laboratori: 8h

Aprenentatge autònom: 14h

SISTEMA DE QUALIFICACIÓ

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%)

BIBLIOGRAFIA

Bàsica:

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

RECURSOS

Altres recursos:

Provided in the Moodle platform