UAB
Universitat Autònoma de Barcelona

Network Management and Administration

Code: 102776
ECTS Credits: 6

2025/2026

Degree	Type	Year
Computer Engineering	OB	3
Computer Engineering	OT	4

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Recommendations: to have passed the subjects Foundations of Computing, Computer Organisation, Operating Systems and Networks

Objectives and Contextualisation

With this subject, the student will obtain the necessary knowledge for the administration and management of computer networks. The student will be able to apply this knowledge in aspects of general configuration and typical services as well as in monitoring, performance analysis, disaster recovery and security.

Competences

Computer Engineering
- Acquire personal work habits.
- Acquire thinking habits.
- Have the capacity to design, deploy, administer and manage computer networks.
- Have the capacity to understand, apply and manage the guarantee and security of computer systems.

Learning Outcomes

1. Analyse communication requirements in high performance computer systems.
2. Apply knowledge of computer networks to design high performance computer networks.
3. Apply knowledge of the security of high performance computer systems.
4. Design components to guarantee the security of high performance computer systems.
5. Design computer networks for high performance computer systems.
6. Develop a mode of thought and critical reasoning.
7. Estimate the risks associated to high performance computer systems, in terms of their guarantee and security.
8. Manage time and resources available. Work in an organized manner .

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Content

Topic 1: Network management.

Introduction to Gnu / Linux, Virtualization. Cgroups, Containers (LXC, Docker)
Administration of networks in Gnu/Linux systems (interconnection of private/public networks, IPv4/6).
Basic services (DNS/secureDNS, DHCP, LDAP/NIS/AD, SSH).
Network storage (NFS, DFS, SMB/CIF, CDN).
Management of integrated networks (WAN, Mobile, Domestic, LAN, IoT).
Software Defined Networks (SDN)

Topic 2: Network management.

Standard management models (OSI, Internet).
Functional areas (configuration, benefits, security, fault, accounting).
Introduction to SNMP, MIB.
Monitoring tools (tcpdump, Icinga/Nagios, Cacti, MRTG)

Topic 3: Network security

PKI Infrastructure and Digital Certificates (Certifying Entity).
Authentication: Passwords, Hashing (Hash Functions)
Access Authentication: PAM, LDAP.
Firewalls and proxies (Iptables, nftables, Apache Proxy, SOCKS, Squid).
Virtual private network (OpenVPN).
Security in wireless networks and virtual networks (MITM, DMZ, Brute-Force / SYN Flood Attacks).
Detection of intrusions and vulnerabilities (Nmap, Snort, OpenVas). Mitigation D/DoS.
Security in services (WAF).

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Applied concepts	11.5	0.46	3, 2, 6, 4, 7
Conceptual classroms	22.1	0.88	3, 2, 6, 4, 7, 8
Labs	11.5	0.46	1, 3, 6, 4, 5, 7, 8
Type: Autonomous			
Home work	100	4	

The subject contains three sections where each one will have a methodology appropriate to the type of teaching provided:

Conceptual classrooms: the theoretical and conceptual aspects of the contents of the subject.

Applied concepts: collaborative group work in the classroom with tutoring by the teacher in each group and in each session. The group will have to develop certain subjects assigned by the teacher.

Practical sessions: sessions of groups of 2 students. These students will develop labs about specific items in the laboratory of the subject (the student must have 80% attendance at these sessions).
To promote learning and interaction, it is recommended that each student have a digital device with a browser (preferably laptop) in order to connect to the subject's cloud.

TRANSFERABLE COMPETENCES

In the subject, as well as the work and evaluation of the basic/specific competences, the transversal competences will be considered in each section (and will be evaluated):

T01.01 - Develop critical thinking and reasoning: in conceptual aspects and concepts applied in classrooms. This will be evaluated in the assessment testthat students will take during the course.
T02.03 - Manage time and resources available. Work in an organised manner: these competences will be worked on in all the sessions and will be evaluated in the practical sessions.
Use of AI: The use of Artificial Intelligence (AI) tools is permitted in this subject as part of your work's development, provided the final submission reflects your significant analytical and reflective contribution. You must transparently identify AI-generated content, specify the tools used, and include a critical reflection on their role in your process and outcomes. Lack of proper disclosure will be treated as a violation of academic integrity, potentially resulting in grade penalties or stricter sanctions in serious cases.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Applied concepts	25%	1	0.04	3, 2, 6, 4, 5
General concepts	30%	1.4	0.06	1, 2, 6, 4, 5, 7
Labs	45%	2.5	0.1	1, 2, 5, 8

Course Assessment

Given its practical nature, this course does not offer a single final assessment option.

a) Assessment Process and Activities

Student evaluation will be based on the following components:

- General Concepts: Automated individual tests (via UAB's Virtual Campus) covering theoretical content. The average score must be 5 or higher.

- Applied Concepts: Automated individual tests (via UAB's Virtual Campus) covering applied content. The average score must be 5 or higher.

- Practical Work: Evaluation of collaborative and individual work, conducted individually & exclusively through UAB's infrastructure. The average score must be 5 or higher.

b) Assessment Schedule

Evaluation is continuous, with submissions made through the Virtual Campus. Dates may change due to unforeseen circumstances, with updates communicated through the Virtual Campus, the official communication platform between instructors and students.

c) Re-assesment Process

Students who fail any component (general/applied concepts or practical work) but maintain an overall weighted score of ≥3 may re-assesment the failed component.

- Final grades only include components with ≥5. If any component remains below 5 after re-assesment, the course is failed, and the final grade will be the weighted average (if <5) or 4.5 (if weighted average is ≥5).

- Re-assesment dates will be published in the School's official exam calendar.

d) Grade Review

- General/Applied Concepts: As grading is automated, students may request a report on failed topics. Answers will not be reviewed unless demonstrable errors exist in the solutions.

- Practical Work: Students who fail may request a review of sections scored below 5 with th professor.

e) Grading

- Honors Distinction (MH): Awarded to students with a final grade ≥9.00, following professors deliberation (maximum 5% of enrolled students). This distinction is not automatic and considers both academic excellence and additional merits.

- No Show: All missing assessments results in a "Not Evaluated" mark.

f) Academic Irregularities & Plagiarism

Any irregularity (plagiarism, unauthorized AI use in assessments, prohibited devices, etc.) will result in a 0 for the affected component, with no re-assesment option. If the component is mandatory to pass, the course will be failed immediately.
In future course editions, students committing irregularities will not have any assessment components recognized.

h) Evaluation of Repeating Students

Students who previously passed practical work (grade ≥5) may request validation for the current academic year only.

Bibliography

(BR) Administració/Administració Avançada del Sistema Operatiu GNU/Linux. (OCW-UOC) Edició 2016.	Remo Suppi i Josep Jorba	Document electrònic
http://hdl.handle.net/10609/60687 http://hdl.handle.net/10609/60685		

(BR) Network Security : Private Communications in a Public World.
Kaufman, Charlie.; Perlman, Radia.; Speciner, Mike.; Perlner, Ray.
2022/ 3rd ed.

(BR) The practice of system and network administration
Limoncelli, Tom, autor; Hogan, Christina J., autor; Chalup, Strata R., autor
2017/ Third edition

Network security essentials : applications and standards
Stallings, William, autor
2017/ Sixth edition

Network security
Perez, Andre, author.
2014/ 1st ed.

(BR) Network management : principles and practice
Subramanian, Mani
2011/ 2nd ed.

Network management : concepts and practice, a hands-on approach
Burke, J. Richard
2004

Fundamentos de seguridad en redes : aplicaciones y estándares
Stallings, William.; González Rodríguez, Manuel
2003/ 2ª ed.

Firewalls and Internet security : repelling the Wily Hacker
Cheswick, William R.; Bellovin, Steven M.; Rubin, Aviel D.
2003/ 2nd ed.

Network intrusion detection
Northcutt, Stephen
2003/ 3rd ed

Software

Students must use VirtualBox (open source software) on their personal computers and a Browser to connect to the Department's Cloud and run virtual machine software. All the software used in the course is done so under a free licence.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	430	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	431	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	432	Catalan/Spanish	first semester	morning-mixed