UAB
Universitat Autònoma de Barcelona

2021/2022

Network Management and Administration

Code: 102776
ECTS Credits: 6

Degree	Type	Year	Semester
2502441 Computer Engineering	OB	3	1
2502441 Computer Engineering	OT	4	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

Name: Remo Suppi Boldrito

Email: Remo.Suppi@uab.cat

Use of Languages

Principal working language: catalan (cat)

Some groups entirely in English: No

Some groups entirely in Catalan: No

Some groups entirely in Spanish: No

Prerequisites

Recommendations: to have passed the subjects of Foundations of Computing, Computer Organization, 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 inmonitoring, 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 .

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).

Methodology

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

Conceptual classroms: The theoretical and conceptual aspects of the contents of the subject.

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

Practices: sessions of groups of 2 students. These students will develop some labs about specific items in the laboratory of the subject.

TRANSVERSAL 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 a critical thinking and reasoning mode: in conceptual and concepts applied classrooms and will be evaluated in the assessment test that students will do during the course.
T02.03 - Manage time and resources available. Work in an organized manner: these competences will be worked in all the sessions and will be evaluated in the practical sessions.
Considering the exceptional situation and in accordance with the indications of Studies Coordination, the subject will be taught in virtual format using the UAB tools.

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.

Activities

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	

Assessment

a) Evaluation activities

The evaluation of the student will be based on the evaluation of the different activities of the subject:

General concepts: individual quiz of general concepts developed in the whole subject.

Applied concepts: quiz for the evaluation of concepts developed in workgroup.

Practices: assessment of collaborative work and personal work developed during the sessions.

Important: the activity of Practices are not recoverable, if the grade is lower than 5, the can't pass the subject.

b) Calendar of evaluation activities

The evaluation activities will be continued and the delivery is through the Virtual Campus. The dates of continuous evaluation and work delivery will be published at virtual campus.

The student will be informed in the virtual campus about possible changes since this is the information interchange platform between teachers and students.

c) Recovery process

If the student don't pass the individual evaluation of general/applied concepts and with practice grade >= 5 points and that the weighted grade is >= 3.5 points, an additional quiz will be programed.

The notes will compute the indicated percentage >= 5 points. Otherwise and after the recover quiz the student don't reach 5 points in each part, the student will not pass the course and as a final grade will have the equivalent weighted grade if <=5 or 4.5 if the calculation of the grade weighted this note is greater >=5.

d) Review of qualifications

For each evaluation activity, a place, date and time of revision will be fixed. The student can review the activity with the teacher. If the student does not apply for this review, this activity will not be reviewed later.

e) Qualifications

Honor Grade. Honor grade is the decision of the subject staff. The regulations of the UAB indicate that HG can only be granted to students who have obtained a final grade >= 9.00 and only can be assigned up to 5% of HG of the total number of students enrolled.

The award of MH is considered a merit and sign of excellence and is reserved for students who meet the requirements and not will be assigned automatically.

In the case of not attending any evaluation the student will have a Not Evaluable as the final grade of the subject.

f) Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures and in accordance with current academic regulations, irregularities committed by a student in an evaluable activity will have a grade = zero (0).

These evaluation activities qualified with zero (0) will not be recoverable. If this activity is necessary to pass compulsory evaluation activities, this subject will be suspended directly (without the opportunity to recover it in the same course).

These irregularities include, among others:

- the total or partial copy of a work, report, or any other evaluation activity;
- let copy;
- present a group work not done entirely by the members of the group (applied to all members, not only those who have not worked);
- present as own materials prepared by a third party, even if they are translations or adaptations, and in general works with non original and exclusive elements of the student;
- have communication devices (such as mobile phones, smart watches, camera pens, etc.) accessible during individual evaluation quiz;
- talk with peers during individual quiz;
- copy or attempt to copy from other students during the evaluation quiz;
- use or attempt to use writings related to the subject during the individual quiz.

In future editions of this subject, students with this irregular actions can't compesate activities from previous year.

In summary: the copy or plagiarism (or attempting) in any of the evaluation activities is equivalent to don't pass the subject & this action invalidate compensatory activities in subsequent courses.

h) Students that don't pass the subject in previous year.

These students, with a practices grade >= 5 can compensate the practices of the curent year.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Applied concepts	20%	0.4	0.02	3, 2, 6, 4, 5
General concepts	48%	4	0.16	1, 2, 6, 4, 5, 7
Labs	32%	0.5	0.02	1, 2, 5, 8

Bibliography

Remo Suppi i   Document
Josep Jorba   electrònic

(BR) Administració/Administració Avançada del Sistema Operatiu
GNU/Linux. (OCW-UOC) Edició 2016.

http://openaccess.uoc.edu/webapps/o2/handle/10609/60687
http://openaccess.uoc.edu/webapps/o2/handle/10609/60685

(BR) Network Security. André Pérez. *John Wiley & Sons Incorporated.* Willey Online Library eBooks EBS (UAB) 2014		Document electrònic
Firewalls and Internet security : repelling the Wily Hacker / William R. Cheswick, Steven M. Bellovin, Aviel D. Rubin	Cheswick, William R.	Document físic
(BR) Fundamentos de seguridad en redes : aplicaciones y estándares / William Stallings ; revisión técnica: Manuel González Rodríguez, Luis Joyanes Aguilar	Stallings, William, autor	Document electrònic
Network intrusion detection / Stephen Northcutt, Judy Novak	Northcutt, Stephen	Document físic
Network management : concepts and practice, a hands-on approach / J. Richard Burke	Burke, J. Richard	Document físic
Network management : principles and practice / Mani Subramanian	Subramanian, Mani	Document físic
Network security essentials : applications and standards / William Stallings	Stallings, William, autor	Document físic
Network security : private communication in a public world / Charieli Kaufman, Radia Perlman, Mike Spencer	Kaufman, Charlie	Document físic
(BR) The Practice of system and network administration / Thomas A. Limoncelli, Christine J. Hogan, Strata R. Chalup	Limoncelli, Tom	Document físic

Software

Students must use VitualBox (open source software) from their personal computers and a Browser to connect to the Department's Cloud and run virtual machines. All the software used in the course is under a free license.