

Course guide

340356 - XACO-C4O44 - Computer Networks

Last modified: 09/02/2024

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2018). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: RAFAEL MORILLAS VARON

Others: RAFAEL MORILLAS VARÓN
MARC JOFRÉ CRUANYES

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. CEFB5. Knowledge of informatic systems, its structure, function and interconnection, as well as fundamentals of its programming.
2. CEF11. Knowledge and application characteristics, functions and structure of Distributed Systems, Computer Networks and the Internet and design and implement applications based on them.
3. CEF13. Knowledge and application of necessary tools for storage, processing and access to informatic systems, including the ones based on webs.
4. CETI4. Ability to select, design, deploy, integrate and manage network and communications infrastructure in an organization.
5. CETI6. Ability to design systems, applications and services based on network technologies, including internet, website, e-commerce, multimedia, interactive services and mobile computing.
6. CE17. Knowledge and use of the concepts of network architecture, protocols and communication interfaces.
7. CE18. Ability to distinguish net concepts of access and transport, circuits and package commutation nets, fixed and mobile nets, as well as of application systems of distributed nets, voice, data and audio services and interactive and multimedia services.
8. CE19. Knowledge of interconnection and routing methods, as well as basics of planning, network dimensioning based on traffic parameters.
9. CE20. Knowledge of current rules and regulation of telecommunication in national, european and international levels.
10. CE6. Ability to independently learn new skills and appropriate techniques to the design development or exploitation of systems and telecommunication services.
11. CE7. Ability to use computing and communication applications (office automation, databases, advanced calculus, project management, visualization, etc.) to support development and operations of networks, applications and services of telecommunications and electronics.
12. CE8. Ability to use research tools and bibliographic information related to telecommunications and electronics

Transversal:

13. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
14. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
15. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
16. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

TEACHING METHODOLOGY

As this is an introductory course in Computer Networks, in theory classes / problems explaining the basic concepts and development of techniques for the resolution of related exercises.

LEARNING OBJECTIVES OF THE SUBJECT

The course aims to introduce students to the study of computer networks, considering the Internet as the fundamental model where students can check all the concepts presented. Emphasis is placed on the concepts related to the interconnection of heterogeneous networks.

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	45,0	30.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

Subject 1: Introduction to computer networks

Description:

- 1.1 Computer network concept
- 1.2 Architecture of computer networks
- 1.3 Elements that make up a computer network
- 1.4 Characteristics of computer networks

Full-or-part-time: 40h

Theory classes: 20h

Self study : 20h

Subject 2: Logical networks: Internet

Description:

- 2.1 TCP/IP stack
- 2.2 Network layer
- 2.3 ICMP
- 2.4 Transport Layer

Full-or-part-time: 40h

Theory classes: 20h

Self study : 20h



Subject 3: Physical networks: LAN

Description:

- 3.1 Introduction to data link layer
- 3.2 IEEE link level
- 3.3 Ethernet IEEE 802.3

Full-or-part-time: 18h

Theory classes: 9h

Self study : 9h

Tema 4: Physical networks: WLAN and access networks

Description:

- 4.1 Wi-Fi
- 4.2 Organization and deployment of the network
- 4.3 Access networks

Full-or-part-time: 18h

Theory classes: 9h

Self study : 9h

Practice 1

Description:

Devices and Basic Parameters of Computer Networks

Full-or-part-time: 9h 20m

Laboratory classes: 4h 40m

Self study : 4h 40m

Practice 2: Ethernet, IP & TCP

Description:

TCP/IP configuration of a connected device
Study TCP/IP protocols in switched Ethernet network

Full-or-part-time: 9h 20m

Laboratory classes: 4h 40m

Self study : 4h 40m

Practice 3: LAN Wireless and Connected

Description:

Joined and comparison between Wi-Fi and Connected
Device and main parameters Wireless: Wi-Fi

Full-or-part-time: 9h 20m

Laboratory classes: 4h 40m

Self study : 4h 40m



Activity 1

Description:

Exercises Topic 1

Full-or-part-time: 2h

Self study : 2h

Activity 2

Description:

Exercises Topic 2

Full-or-part-time: 2h

Self study : 2h

Activity 3

Description:

Simulation of the TCP Protocol Timeout Interval.

Full-or-part-time: 1h

Self study : 1h

Activity 4

Description:

Consgestion Control Algorithm

Full-or-part-time: 1h

Self study : 1h

GRADING SYSTEM

The evaluation of the course is divided into theory / (problems, activities (70% = 60% + 10 %), and practices (30%). The theory grade / problems is determined by two tests that constitute the continuous evaluation of the course, these tests have a percentage of the 30% and 70% respectively, and are not liberators, should make the final course exam.

$\text{Nota_Exams} = \max [0,4 (\text{Ex. Parcial}) + 0,6 (\text{Ex. Final}); \text{Ex. Final}]$

$\text{Nota_Activities} = (A1 + A2 + A3 + A4) / 4$

$\text{Nota_Practices} = (P1 + P2 + P3) / 3$

$\text{Nota_Subject} = 0,6 (\text{Nota_Exams}) + 0,3 (\text{Nota_Prácticas}) + 0,1 (\text{Nota_Activities})$

Also evaluate the delivery of exercises and presentation of specific jobs within the note of theory.

BIBLIOGRAPHY

Basic:

- García Teodoro, Pedro; Díaz Verdejo, Jesús Esteban; López Soler, Juan Manuel. Transmisión de datos y redes de computadores [on line]. 2a ed. Madrid: Pearson Educación, 2014 [Consultation: 19/02/2024]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4704. ISBN 9788490354612.
- Kurose, James F.; Ross, Keith W. Redes de computadoras : un enfoque descendente [on line]. 7a ed. Madrid: Pearson, 2017 [Consultation: 19/02/2024]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6752. ISBN 9788490355282.
- León-García, Alberto; Widjaja, Indra. Redes de comunicación : conceptos fundamentales y arquitecturas básicas. Madrid [etc.]: McGraw-Hill, 2002. ISBN 8448131975.

Complementary:

- Stallings, William. Comunicaciones y redes de computadores [on line]. 7a ed. Madrid [etc.]: Pearson Educación, 2004 [Consultation: 15/02/2024]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1245. ISBN 9788483227589.

RESOURCES

Hyperlink:

- Transmisión de datos y redes de computadores. https://discovery.upc.edu/discovery/fulldisplay?docid=alma991001708009706711&context=L&vid=34CSUC_UPC:VU1&lang=ca&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&isFrbr=true&tab=Everything&query=any,contains,transmisi%C3%B3n%20de%20datos%20y%20redes%20de%20computadores&sortby=date_d&facet=frbrgroupid,include,9039539512776393431&offset=0