

Advanced Networks and Security**2013/2014**

Codi: 42850

Crèdits: 6

Titulació	Tipus	Curs	Semestre
4313797 Enginyeria de Telecomunicacions / Telecommunication Engineering	OB	1	1

Professor de contacte

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Utilització d'idiomes

Llengua vehicular majoritària: anglès (eng)

Prerequisites

Knowledge of basic network communications architecture is desired.

Objectius

The objective of this module is to deepen in the communication networks and in its security. In concrete, it will be centred in providing to the students knowledge on:

1. Introduction to the communication layers architecture and security in Internet
2. Description of the Internet architecture and the advanced routing protocols
3. Content Management services
4. Next Generation Internet protocols
5. Advanced network security

Competències

- Enginyeria de Telecomunicacions / Telecommunication Engineering
- Be capable of resolving convergence, interoperability and design of heterogeneous networks with local, access and trunkal networks as well as the integration of telephone, data, television and interactive services.
 - Be capable of understanding and knowing how to apply internet organisation and function, next generation internet technologies and protocols, components models, intermediary software and services.
 - Capacity for modelling, designing, introducing, managing, operating, administrating and maintaining networks, services and content.
 - Capacity for planning, decision-making and packaging of networks, services and applications considering the quality of service, direct and operating costs, the implementation plan, supervision, security procedures, scaling and maintenance and for managing and ensuring quality in the development process.
 - Capacity for working in interdisciplinary teams
 - Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
 - Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
 - Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Resultats d'aprenentatge

1. Capacity for working in interdisciplinary teams
2. Integrate services and security in current and next generation internet.
3. Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
4. Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
5. Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously
6. Understand global internet architecture and the channelling protocols used.
7. Understand security procedures in networks, services and applications.
8. Understand the advanced mechanisms of cryptography and the main attacks and security mechanisms on the different levels of the web and in next generation internet.
9. Understand the architecture of content management services
10. Understand the design and administration mechanisms of content management services.
11. Understand the layers of architecture in internet communications, protocols and principal services.
12. Understand the main protocols associated with the next generation of internet.

Continguts

Structure and contents:

1. Protocols and Architectures

- Protocols, interfaces and services
- Network architectures

2. Advanced Routing Protocols

- Internet architecture
- RIP
- OSPF
- BGPv4

3. Content Management Services

- Content management services architecture
- Content management services design
- Content management services administration

4. Next Generation Internet

- IPv6
- Mobile IP
- Opportunistic networks

5. Network Security

- Advanced cryptography
- Attacks and prevention mechanisms in the different network layers
- Security in Next Generation Internet

Metodologia

The work methodology will combine the face-to-face classes, the realisation of works in the laboratory, the realisation of works from recommended readings and the autonomous work of the student. It will make use of

the virtual platform and the presentation of works related with the thematic blocks will be required.

During the subject, we will carry out the following activities:

- Theory sessions, where the teacher will provide information on the knowledge of the subject and on strategies to acquire, expand and organise this knowledge. The active participation of the students will be encouraged during these sessions, for example posing discussions in those points that admit diverse technological solutions.
- Problems sessions, where the students will have to actively take part to consolidate the knowledge acquired resolving, presenting and debating related problems. Problems are distinguished from the exercises, which can be considered as trivial problems. The problems often will admit several solutions and will be able to originate debate between the students.
- Laboratory practical sessions, where small projects will be posed to be analysed and developed by the students in group. The sessions will be previously prepared, documented and programmed by the teacher, and the students will have to prepare them before assisting, reviewing the related theoretical knowledge and the basic technical aspects developmental. The practical sessions must serve to the students to attain the skills of the subject and contribute to attain some competitions such as the one of autonomous work.
- Preparation of the portfolio of the subject, in a virtual way through a wiki, collaborative work web tool. The students will have to work autonomously in teams in the research and the preparation of the corresponding material of the evidences of his theory and problems learning, and in the study of this material. The evidences comprise extensions of the different subjects exposed to the sessions of theory and collaborative resolution of problems. The teacher will do the follow-up of the work of the different teams, will provide feedback to the teams depending of the task done and of the doubts that pose or of the errors that manifest. The preparation of the portfolio has to serve to the students to contribute to attain the competitions of the subject. The teaching methodology and the evaluation go tightly tied to the wiki-based virtual portfolio system, that is the cohesive element of the different teaching activities during the course, and that allow a system of continued and formative evaluation, incorporated to the process of education/learning. The wiki will help the students to develop a constant work that will bring them to attain the knowledge proposed, and the skills and the competitions associated to the theory and problems parts.

Activitats formatives

Títol	Hores	ECTS	Resultats d'aprenentatge
Tipus: Dirigides			
Directed activities	30	1,2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Tipus: Supervisades			
Supervised activities	30	1,2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Tipus: Autònomes			
Autonomous activities	90	3,6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Avaluació

Evaluation systems

- Written tests: Partial and final written tests
- Delivery of reports or problems: Brief reports on specific subjects
- Work in the laboratory and corresponding memories: it will evaluate the previous preparation of the practice, the capacity to realise it in an efficient form and the quality of the analyses reflected in the

- memory.
- Presentations and participation in the problems and cases seminars: it will evaluate the previous preparation of the exercises/cases assigned for the session

Activitats d'avaluació

Títol	Pes	Hores	ECTS	Resultats d'aprenentatge
Delivery of reports or problems	10%	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Presentations and participation in the problems and cases seminars	25%	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Work in the laboratory and corresponding memories	25%	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Written tests	40%	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Bibliografia

- Aspectos avanzados de seguridad en redes. Jordi Herrera Joancomartí (coord.), Joaquín García Alfaro, Xavier Perramón Tornil. Segunda edición, febrero 2007. Fundació per a la Universitat Oberta de Catalunya (<http://ocw.uoc.edu/informatica-tecnologia-y-multimedia/aspectos-avanzados-de-seguridad-en-redes/mate>)