Syllabus

1. Descriptive information on the subject

- Subject: Networks and Services
- Academic year: 2011/2012   Year: 1   Term: 1
- Degree:
  – Bachelor's degree in Computer Science
  – Bachelor's degree in Audiovisual Systems Engineering
  – Bachelor's degree in Telematics Engineering
- Subject's code: 21410, 21299, 21599
- ECTS credits: 4 ECTS   Time commitment: 100 hours
- Languages: Catalan, Spanish and English (part of the material)
- Teaching staff: Boris Bellalta, Anna Sfairopoulou and Cristina Cano

2. Presentation of the subject

The Networks and Services subject is just located in the 1st term of the 1st year in the bachelor's degree in Computer Science, Audiovisual Systems Engineering and Telematics Engineering.

The aim of this subject is to provide a first introductory but comprehensive overview (from the physical environment to the user) of communication networks, specially emphasizing the fundamental aspects which define their operation and their own justification. Thus, for instance, it is set out the need to have mechanisms that allow different users to share the same link, the need to identify the different network nodes (addresses) and, among other things, the need for mechanisms that find routes between an origin and a destination. Once the needs are justified, the solutions that are used in current communication networks, that is to say: in Internet, are also considered.

The methodology of work is based on lectures, where the basic contents of the subject are set out; seminar lectures, where students will work on the developed concepts in lectures, and the laboratory practical sessions, where students will experiment with some of the explained concepts during the entire subject.

Although the subject has an important part of theoretical content, we will also work on solving problems related to the benefit calculation of communication networks: the delay calculation, the calculation of probabilities of error and the calculation of use a link, among others. Even though these exercises do not require a mathematical basis, it is expected that students have some skills in doing mathematical operations and understanding them.

3. Competences to be obtained in the subject

Instrumental

1. Capacity to analyze and summarize.

2. Problem resolution.

3. Capacity to organize and plan.

Interpersonal

4. Critical reasoning.

Systemic

5. Research skills.

6. Learning capacity.

7. Skill to work autonomously.

8. Motivation for the quality.

Specific competences

1. Understand the physical architecture (the network of the networks) and the Internet logic (modularity).

2. Understand the need to transform bits in a tangible physical magnitude for transmission over the channel, the negative consequences (mistakes) and how to solve them (detection / correction and retransmissions).

3. Understand the operation of mechanisms to share a link among the traffic (packets) of different users.

4. Understand the need and operation of the addressing and routing in multi-hop networks.

5. Understand the need and the operation of data transport mechanisms offered by Internet.

6. Know the main paradigms in terms of developing distributed applications on Internet.

4. Contents

Unit 1: Introduction to Internet

Unit 2: Digital transmission on physical channels

Unit 3: Transmission errors: detection, correction and retransmission of packets

Unit 4: Multi-User domains: channel sharing

Unit 5: Multi-hop networks: addressing and routing IP

Unit 6: Data transport, congestion and flow control: TCP and UDP

Unit 7: Contents, applications and distributed services: costumer / server vs P2P

5. Evaluation

CA: Continuing assessment
PR: Laboratory practical sessions
PE: Partial Examination

ED: Examination Sitting December
ES: Examination Sitting September

Grade Sitting December= maximum (Mark_D_A,Mark_D_B)
Mark_D_A = 0.6·ED+0.2·PE+0.1·CA+0.1·PR
Mark_D_B = 0.8·ED+0.1·CA+0.1·PR

Grade Sitting September = ES

6. Bibliography and didactic resources

Kurose, J. F., Ross, K. W, "Computer Networks, A Top-Down Approach Featuring the Internet", Pearson Addison Wesley.

Leon-Garcia,Widjaja; "Communication Networks. Fundamental Concepts and Key Architectures". McGrawHill International.

7. Methodology

The following methodology will depend on the kind of session:

– **Lectures**: the lecturer will guide the session where the contents will be set out, the exercises / problems will be solved and the contents of this subject will be discussed. However, it is expected that students participate actively in these sessions with questions or answering the lecturer's ones.

– **Seminar sessions**: the seminars have the aim that students put into practice autonomously what is explained in lectures. Thus, in a seminar session, it is expected that students make some activities where they have to face with the kind of activities / problems that are expected to be solved. The lecturer's role will be supporting this activity and solving doubts.

– **Laboratory practical sessions:** in this subject, laboratory sessions have an important formative part because lectures and seminar sessions' aspects are put into practice. As in the seminar sessions, in the laboratory practical sessions the student will have to do the proposed activity. The lecturer will support the doubts resolution.

8. Activities planning

The temporary planning of the lectures, seminar sessions and laboratory sessions can be consulted in:
http://www.upf.edu/esup/

In detail, the planned activities and their commitment are:

- There are 3 planned activities submissions: weeks 3, 5 and 7.
    The commitment for each submission is estimated at 4 hours.

- In weeks 6, 10 and 11, it is needed to submit the report of the essays 1, 2 and 3 respectively.
    For each essay, beyond the length of the session in the classroom, it is considered that the student has to devote 3 hours.

- The necessary weekly study to follow the subject correctly is estimated at 4 hours.

- The partial examination is expected to take place during the week 8.
    Bringing the subject up to date, it is necessary to devote 10 hours to prepare this examination.

- The final exam will take place during the exams period in the first term.
    Bringing the subject up to date, it is necessary to devote 20 hours to prepare this exam.

The time commitment of each activity is only a recommendation regarding what is considered necessary to pass the subject successfully.