



Syllabus

Subject

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| Subject / Group | 22375 - Laboratory of Networks and Telecommunication Projects / 4 |
| Degree | Degree in Telematics Engineering - Fourth year Double Degree in Mathematics and Telematics - Fifth year |
| Credits | 6 |
| Period | Second semester |
| Language of instruction | Catalan |

Professors

| Lecturers | Office hours for students | | | | | |
|--|---------------------------|----------------|-----|------------|----------|---|
| | Starting time | Finishing time | Day | Start date | End date | Office / Building |
| Jaume Ramis Bibiloni <i>(Responsible)</i> jaume.ramis@uib.es | | | | | | You need to book a date with the professor in order to attend a tutoring session. |
| Miquel Àngel Bordoy Marcó miquel.bordoy@uib.es | | | | | | You need to book a date with the professor in order to attend a tutoring session. |

Context

The module “Laboratori de xarxes i projectes de telecomunicació” is addressed to students on the 4th year of the degree 'Grau en Enginyeria Telemàtica' and to students on the 5th year of the double-degree 'Grau en Enginyeria Telemàtica i en Matemàtiques'. Its main objective is to deepen, from a global perspective, into the skills defined in the telecommunications block of the common module as well as into the skills defined in the telematic networks block of the telematic specific module. Along with the subjects “Laboratori d’Electrònica”, “Laboratori d’Informàtica” and “Laboratori de Xarxes, Aplicacions i Serveis Telemàtics” and the “Treball de Final de Grau”, it conforms de practical module of the degree.

Requirements

Recommended

To take full advantage of this course, it is essential that students have the knowledge corresponding to the blocks of Telecommunications and Telematic Networks, detailed below:

Telecommunications block:

- Fonaments de xarxes de telecomunicació
- Arquitectura i interconnexió de xarxes
- Gestió de xarxes
- Instal·lacions de telecomunicació
- Projectes

Telematic networks block:



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- Xarxes d'operadora
- Xarxes d'àrea local i intranets
- Xarxes multimèdia
- Planificació de xarxes

Skills

Specific

- * CC4: Ability to analyze and define the fundamental parameters of a communications system .
- * CC5: Ability to assess the advantages and disadvantages of different technological alternatives of implementation of communication systems, from the point of view of the signal space, disturbance and noise, and analog and digital modulation systems .
- * CC12: Knowledge and use of concepts of network architecture, protocols and communication interfaces .
- * CC13: Ability to differentiate the concepts of access networks and transport networks, circuit-switched and packet-switched networks, wired and mobile/wireless networks, as well as distributed systems and network applications, voice services, data services, audio services, video services and interactive and multimedia services .
- * CC14: Knowledge of methods of network interconnection and routing, as well as the basics of network planning and network dimensioning based on traffic parameters .
- * CC15: Knowledge of legislation and regulation of telecommunications at national, European and international levels .

Generic

- * CG5: Writing skills for projects and technical documentation .
- * CG6: Oral: fluency and clarity in the presentation of results, products and services in both specialized and non-specialized audiences .
- * CG7: Knowledge of software and tools to help in the generation and presentation of documents .
- * CG8: Knowledge of English: ability to understand, speak and write in English, at an intermediate level .
- * CG9: Ability to work in multidisciplinary and multilingual teams .
- * CG10: Leadership .
- * CG11: Ability to manage resources and projects .

Basic

- * You may consult the basic competencies students will have to achieve by the end of the degree at the following address: <http://www.uib.eu/study/grau/Basic-Competences-In-Bachelors-Degree-Studies/>

Content

Range of topics

- A. Review of theoretical contents (3h)
 - A1. Cisco ACLs and NAT
 - A2. LAN Network Access Control
 - A3. LAN and WLAN Networking Devices
 - A4. WAN Networking solutions

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A5. PON and FTTH

A6. Wireless LAN

B. Development of a whole project of telematics engineering (14h)

B1. Technical Project

Design of a company network with different headquarter/offices. The company is divided into different functional departments. The network design must include the LAN and WLAN for each office and the WAN interconnection.

C. Networking laboratory

C1. Routing, DHCP service, NAT/NAPT, IPsec and Cisco ACLs (7h)

C2. UTM Firewalls (5h)

C3. MAC Network Access Control (MAC Locking, MAC Authentication and VLAN Authorization) (5h)

C4. User Network Access Control (Hotspot, IEEE 802.1x and EAP) (6h)

C5. Wireless LAN (6h)

C6. Design and implementation of an Enterprise LAN (8h)

Teaching methodology

In-class work activities (2.4 credits, 60 hours)

| Modality | Name | Typ. Grp. | Description | Hours |
|-------------------|-------------------|------------------|---|-------|
| Practical classes | Practical classes | Large group (G) | Students will work cooperatively (working-teams), developing projects in which they will have to apply the skills corresponding to the telecommunications block and to the telematic networks block. They must develop a telematics engineering technical project, as well as its presentation in class. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG7, CG8, CG9, CG10 and CG11. | 12 |
| Assessment | Laboratory | Medium group (M) | Students will work cooperatively (working-teams) with real network elements in order to improve their knowledge about configuration of real communications/networking devices. Skills CC4, CC5, CC12, CC13, CC14, CC15 and CG5 will be assessed. | 38 |
| Assessment | Exam | Large group (G) | Students must take an exam in the examination period. CC12 and CC14 skills will be assessed. | 2 |
| Assessment | Presentations | Large group (G) | Students will have to present their technical project in class. This way, the skills corresponding to the telecommunications block and to the telematic networks block, as well as their communication skills and their ability to solve problems and to develop projects, will be assessed. There exist the | 2 |

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| Modality | Name | Typ. Grp. | Description | Hours |
|------------|---------|-----------------|---|-------|
| | | | possibility of co-assessment among students to assess this activity. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG5, CG6, CG7 and CG8 will be assessed. | |
| Assessment | Reports | Large group (G) | Students will develop a telematics engineering technical project. The lecturer will continuously monitor and guide students in the development of their project. Given the cooperative-project approach of this subject, mentoring will be developed in working-teams, according to the schedule set by the lecturer. This way, the skills corresponding to the telecommunications block and to the telematic networks block, as well as their ability to solve problems and to develop projects, will be assessed. There exist the possibility of co-assessment among students to assess this activity. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG5, CG6, CG7, CG8, CG9, CG10 and CG11 will be assessed. | 6 |

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

Distance education tasks (3.6 credits, 90 hours)

| Modality | Name | Description | Hours |
|-----------------------|----------------------------|--|-------|
| Individual self-study | Classroom activities study | Students will consolidate the contents introduced in class (labs, mentoring and presentations). They will also have to review contents from previously studied subjects corresponding to the telecommunications block and to the telematic networks block. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG5, CG6, CG7, CG8, CG9, CG10 and CG11. | 40 |
| Group self-study | Projects | Students must develop a telematics engineering technical project, as well as its presentation in class. They will work in groups to perform this activity. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG5, CG6, CG7, CG8, CG9, CG10 and CG11. | 50 |

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

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There are two itineraries:

- Itinerary A is the standard itinerary. To join this itinerary:

- * a minimum attendance of 80% is required
- * work must be developed in teams
- * continuous assessment throughout the term

- Itinerary B is only available for part-time students. In this case:

- * no minimum attendance is required
- * students can choose to work individually
- * final assessment at the end of the term

Assessment will consist of technical project (group-mentoring, report & presentation), laboratory assessment and an exam in the examination period.

Regarding the technical project (it applies to students from both itineraries):

1) Group-mentoring:

- * Students will deliver their assignments corresponding to the technical project throughout the term, according to the schedule set by the lecturer.
- * Team-mentoring with the team members and the lecturer will be performed for each assignment/deliverable.
- * The lecturer will continuously assess the work of the itinerary-A students throughout the term.
- * This activity is non-retrievable.

2) Reports-presentations:

- * At the end of the term, students will have to deliver a final version of their whole technical project (report), according to the schedule set by the lecturer.
- * They will also have to present their technical project in class.
- * This activity is non-retrievable.

Regarding laboratory assessment (it applies to itinerary A students):

- * The lecturer will continuously assess the work of the itinerary-A students throughout the term.
- * This activity is non-retrievable.

Regarding the examination (it applies to students from both itineraries):

- * It is required to obtain a mark greater or equal than 5.
- * In case of failure, the students will have the opportunity to take a second exam in the extraordinary examination period.

Below are details for each assessment procedure, criteria and their weight in the rating of the course for both itineraries.

Frau en elements d'avaluació

In accordance with article 33 of Academic regulations, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a

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undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

Laboratory

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| Modality | Assessment |
| Technique | Other methods (non-retrievable) |
| Description | Students will work cooperatively (working-teams) with real network elements in order to improve their knowledge about configuration of real communications/networking devices. Skills CC4, CC5, CC12, CC13, CC14, CC15 and CG5 will be assessed. |
| Assessment criteria | Degree of participation in the laboratory. Quality and soundness of the reasonings. Precision and accuracy in the answers. |

Final grade percentage: 20% for pathway A

Final grade percentage: 0% for pathway B

Exam

| | |
|---------------------|---|
| Modality | Assessment |
| Technique | Objective tests (retrievable) |
| Description | Students must take an exam in the examination period. CC12 and CC14 skills will be assessed. |
| Assessment criteria | Quality and soundness of reasoning in: - proposed solutions to problems - answers to questions Precision and accuracy of the results. Clarity, intelligibility and spelling and grammatical correctness in the answers. |

Final grade percentage: 40% for pathway A

Final grade percentage: 60% for pathway B

Presentations

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| Modality | Assessment |
| Technique | Oral tests (non-retrievable) |
| Description | Students will have to present their technical project in class. This way, the skills corresponding to the telecommunications block and to the telematic networks block, as well as their communication skills and their ability to solve problems and to develop projects, will be assessed. There exist the possibility of co-assessment among students to assess this activity. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG5, CG6, CG7 and CG8 will be assessed. |
| Assessment criteria | The presentation of the technical project will be assessed taking into account: - Conciseness and precision, organization and structure, suitability to the audience and degree of preparation of the presentation in class. |

Final grade percentage: 15% for pathway A

Final grade percentage: 15% for pathway B

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Reports

| | |
|---------------------|--|
| Modality | Assessment |
| Technique | Papers and projects (non-retrievable) |
| Description | Students will develop a telematics engineering technical project. The lecturer will continuously monitor and guide students in the development of their project. Given the cooperative-project approach of this subject, mentoring will be developed in working-teams, according to the schedule set by the lecturer. This way, the skills corresponding to the telecommunications block and to the telematic networks block, as well as their ability to solve problems and to develop projects, will be assessed. There exist the possibility of co-assessment among students to assess this activity. Skills CC4, CC5, CC12, CC13, CC14, CC15, CG5, CG6, CG7, CG8, CG9, CG10 and CG11 will be assessed. |
| Assessment criteria | The report of the technical project will be assessed taking into account: <ul style="list-style-type: none">- Quality and soundness of the development of the project.- Precision, conciseness, clarity, consistency and spelling and grammatical correctness of the document.- Regarding team-mentoring, degree of participation of students, quality and soundness of their reasonings and precision and accuracy in their answers. |

Final grade percentage: 25% for pathway A

Final grade percentage: 25% for pathway B

Resources, bibliography and additional documentation

Basic bibliography

- * Guía de los Fundamentos para la Dirección de Proyectos (Guía del PMBOK).
- * Transparències i apunts de l'assignatura Xarxes d'Àrea Local i Intranets.
- * Transparències i apunts de l'assignatura Xarxes d'Operadora.
- * Transparències i apunts de l'assignatura Arquitectura i Interconnexió de Xarxes.
- * Transparències i apunts de l'assignatura Projectes.
- * El Treball de Final de Grau a l'EPS (<http://eps.uib.es/gestui-administrativa/>) i les referències allà indicades.
- * El treball en equip (http://www.ice.udl.cat/upu/treball_equip.pps).

Complementary bibliography

- * El proyecto telemático, Sistemas de Cableado Estructurado (SCR) y Proyectos de Infraestructuras Comunes de Telecomunicaciones (ICT), Vamuel Álvarez González y otros autores, COIT, 2006
- * Emerging Technologies in Wireless LANs: Theory, Design, and Deployment, Benny Bing, Cambridge University Press, 2007

Other resources

- * All the information, slides and working material will be available at the web page in Campus Extens.
- * Web page of Colegio Oficial de Ingenieros de Telecomunicación (<http://www.coit.es/>).
- * Web page of Colegio Oficial de Ingenieros Técnicos de Telecomunicación (<http://www.coitt.es/>).

