



INTERNATIONAL
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COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingeniería y Sistemas
de Telecomunicación

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

593000414 - Services And Protocols Engineering

DEGREE PROGRAMME

59AF - Master Univ. Ing. Sistemas y Servicios para la Sociedad de la Información

ACADEMIC YEAR & SEMESTER

2020/21 - Semester 2

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1. Description

1.1. Subject details

Name of the subject	593000414 - Services And Protocols Engineering
No of credits	5 ECTS
Type	Optional
Academic year of the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	59AF - Master Univ. Ing. Sistemas y Servicios para la Sociedad de la Informacion
Centre	59 - Escuela Tecnica Superior de Ingenieria y Sistemas de Telecomunicacion
Academic year	2020-21

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Ruben Diego Martinez (Subject coordinator)	A4411	ruben.de.diego@upm.es	Sin horario. TBD
Jose Fernan Martinez Ortega	A-4407	jf.martinez@upm.es	Sin horario. TBD

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Skills and learning outcomes *

3.1. Skills to be learned

CB10 - To have the learning abilities to continue studying in a mostly self-guided or autonomous manner.

CB6 - To have knowledge that provides the basis or the opportunity of being original to develop and/or to apply ideas, usually in a research context.

CB7 - To be capable of applying the students' acquired knowledge, as well as their problem solving abilities, to new or not well-known environments in broader (or multidisciplinary) contexts that are in the framework of their expertise area.

CE.1 - To be capable of analyzing, interpreting and applying standards related to the ICT.

CE.7 - To be capable of proposing, organizing and executing research works in the framework of the Information Society engineering.

CESE.3 - To be capable of analyzing and developing software applications and protocols for advanced telematic systems.

CESE.4 - To be capable of specifying and designing advanced telematic services.

3.2. Learning outcomes

RA49 - To communicate the conclusions, together with the knowledge and reasons behind them, to both specialized and non-specialized audiences, in a clear and unambiguous manner.

RA48 - Apply new techniques to solve open research problems in the field of services and protocols engineering

RA47 - Describe new techniques associate with the specification and design of highly complex telematic systems

RA46 - Identify researching open areas in the domain of services and protocols engineering

RA45 - Apply new technologies with different systems for solving particular problems in the domain of services and protocols engineering

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

This optional subject is taught during the second semester of the "MSc in Systems and Services Engineering for the Information Society" (Máster en Ingeniería de Sistemas y Servicios para la Sociedad de la Información). Its 5 ECTS correspond to a total of around 133 hours of student's work, including all activities. Any Graduate in Engineering related to the Information and Communication Technologies may follow this course.

4.2. Syllabus

1. UNIT 0: Introduction to ISP
 - 1.1. Introduction to the course
 - 1.2. Supervision session for introducing the group research work topics and methodology
2. UNIT 1: Next generation of telematics services
 - 2.1. Trends to next generation services and systems
 - 2.2. Next generation services a case study
 - 2.3. Open issues and challenges
3. UNIT 2: Advanced networking
 - 3.1. Networking traditional protocols
 - 3.2. New trends in networking
 - 3.3. Networking current technical challenges
4. UNIT 3: Network security protocols and services
 - 4.1. Network security services
 - 4.2. Network security traditional protocols
 - 4.3. Security protocols for advanced network
 - 4.4. Security and privacy technical challenges
5. UNIT 4: Open research issues in services and protocols engineering
 - 5.1. Study of state of the art on Advanced Engineering Techniques on Systems and Telematics Services Development
 - 5.2. Definition of technical reports

5.3. Definition of research papers

5. Schedule

5.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	Unit 0 Duration: 02:00 M1 - Presentation of research work (Lect) Duration: 01:00			
2	Unit 1 Duration: 03:00			
3	Unit 2 and M2 - Group assignment Duration: 03:00			
4	UNIT 4 Duration: 03:00			
5	Supervision on demand Duration: 03:00			
6	Supervision on demand Duration: 03:00			
7				M3 - 10% research work & presentation Continuous assessment and final examination Presential Duration: 03:00 M3- Technical Annex Continuous assessment and final examination Not Presential Duration: 00:00
8				
9	Supervision on demand Duration: 03:00			
10				M4 - 20% research work & presentation Continuous assessment and final examination Presential Duration: 03:00 M4- Technical Annex Continuous assessment and final

				examination Not Presential Duration: 00:00
11	Supervision on demand Duration: 03:00			
12				M5 - 50% research work & presentation Continuous assessment and final examination Presential Duration: 03:00 M5- Technical Annex Continuous assessment and final examination Not Presential Duration: 00:00
13	Supervision on demand Duration: 03:00			
14				M6 - 80% research work & presentation Continuous assessment and final examination Presential Duration: 03:00 M6- Technical Annex Continuous assessment and final examination Not Presential Duration: 00:00
15	Supervision on demand Duration: 03:00			
16				M7 - 100% research work & presentation Continuous assessment and final examination Presential Duration: 03:00 M7- Technical Annex Continuous assessment and final examination Not Presential Duration: 00:00
17				M8 - Critical review (ON-LINE) Continuous assessment and final examination Presential Duration: 03:00

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
7	M3 - 10% research work & presentation		Face-to-face	03:00	2%	2 / 10	CE.7 CB6 CB7 CE.1
7	M3- Technical Annex		No Presential	00:00	5%	2 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
10	M4 - 20% research work & presentation		Face-to-face	03:00	3%	2 / 10	CE.7 CB6 CB7 CE.1
10	M4- Technical Annex		No Presential	00:00	10%	2 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
12	M5 - 50% research work & presentation		Face-to-face	03:00	10%	2 / 10	CE.7 CB6 CB7 CE.1
12	M5- Technical Annex		No Presential	00:00	10%	5 / 10	CE.7 CB6 CB7 CESE.3 CE.1 CESE.4 CB10

14	M6 - 80% research work & presentation		Face-to-face	03:00	10%	5 / 10	CB6 CB7 CE.7 CE.1
14	M6- Technical Annex		No Presential	00:00	10%	5 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
16	M7 - 100% research work & presentation		Face-to-face	03:00	15%	5 / 10	CE.7 CB6 CB7 CE.1
16	M7- Technical Annex		No Presential	00:00	15%	5 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
17	M8 - Critical review (ON-LINE)		Face-to-face	03:00	10%	5 / 10	CE.7 CB6 CESE.3

6.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
7	M3 - 10% research work & presentation		Face-to-face	03:00	2%	2 / 10	CE.7 CB6 CB7 CE.1
7	M3- Technical Annex		No Presential	00:00	5%	2 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
10	M4 - 20% research work & presentation		Face-to-face	03:00	3%	2 / 10	CE.7 CB6 CB7 CE.1
10	M4- Technical Annex		No Presential	00:00	10%	2 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4

12	M5 - 50% research work & presentation		Face-to-face	03:00	10%	2 / 10	CE.7 CB6 CB7 CE.1
12	M5- Technical Annex		No Presential	00:00	10%	5 / 10	CE.7 CB6 CB7 CESE.3 CE.1 CESE.4 CB10
14	M6 - 80% research work & presentation		Face-to-face	03:00	10%	5 / 10	CB6 CB7 CE.7 CE.1
14	M6- Technical Annex		No Presential	00:00	10%	5 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
16	M7 - 100% research work & presentation		Face-to-face	03:00	15%	5 / 10	CE.7 CB6 CB7 CE.1
16	M7- Technical Annex		No Presential	00:00	15%	5 / 10	CB10 CE.7 CB6 CB7 CESE.3 CE.1 CESE.4
17	M8 - Critical review (ON-LINE)		Face-to-face	03:00	10%	5 / 10	CE.7 CB6 CESE.3

6.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

6.2. Assessment criteria

Note for students in master termination phase.

During the master's completion phase, students must perform the same work as the last time the subject was taught, except perhaps the parts related to "group work".

The "group work", if it is not possible to create a group, will be replaced by interaction with teachers to simulate group relationships.

Activity planning

The students will have to complete a total of about 133 hours (5 ECTS) of work for passing the course. This includes all the time that the students have to spend on course-related activities, including not only in-class time but also all the activities to be done autonomously, either individually or in groups. The autonomous time that the students are foreseen to spend to pass the course is the following:

- Autonomous personal study: 30 hours.
- Autonomous group work: 12 hours.
- Preparatory work for making the oral presentations: 10 hours.
- Preparatory and writing work related to the research reports: 30 hours.
- Critical assessment of technical documents (additional to the time scheduled below): 3 hours.

The following table define the milestones for guaranteeing the quality control of all the activities during the course:

Mileston number	Milestone description
M1	Presentation of research work to be carried out (by teachers)
M2	Group assignment
M3	Delivery of 10% of research work and slides.Presentation
M4	Delivery of 20% of research work and slides.Presentation

M5	Delivery of 50% of research work and slides. Presentation
M6	Delivery of 80% of research work and slides. Presentation
M7	Delivery of 100% of research work and slides. Presentation
M8	Delivery of critical reviews

Teaching, learning and evaluation activities: Methodology

The students should carry out properly and on time the activities defined by the lectures of the subject, which will be to the satisfactory accomplishment and evaluation of the learning results. A Brief description of the used organizational modalities and the employed learning methods are depicted as follows:

- **Theory:**

For each one of the first three units (1 to 3) there will be an introductory session made by a teacher, with the objectives of giving a general technological overview of the topic, providing extra recommended bibliography, ensuring that the students get at least a minimum common background and establishing the main vocabulary and concepts.

- **Research work:**

Unit 4 consists on the development of a research work. Students will have to perform a research paper presenting it orally. This will require a considerable amount of time, which will be spent on searching scientific information, synthesizing it and analysing it for new solutions.

- **Autonomous work:**

Each student will have to spend time on reading documents, searching for information, performing the part of the group work they have been assigned with, and in general, assessing that they have grasped the main concepts, knowledge and abilities that will allow them to demonstrate their competence for passing the course evaluation.

- **Group work:**

There are two main activities that will require group work: i) Students will have to obtain the conclusions of the research work associated to unit 4, it will be proposed by the teachers on specific subjects. ii) Students will have to work in groups for reaching a consensus and a common understanding of the work to perform, by assigning tasks to each of the members, by putting in common their work, by integrating their results and, by preparing the corresponding presentations and reports.

- **Supervision:**

Groups of students will be tutored by the lecturers on specific pre-scheduled sessions. This will allow the students to ask questions, raise the problems they have not autonomously been able to solve and receive advice on how to continue or tailor their work for the future.

Assessment and evaluation system

The final mark for each student in this course will be a number between 0 and 10 points. The course is passed if the mark is equal or above 5 points.

The course is designed to be passed using continuous evaluation. The research work performed by the students has a very significant weight in the total course mark, since the total students' work necessary to pass this part of the course is foreseen to be high. This is the reason why in the case of there being a final exam, it is mandatory to have previously passed the research work-related part of the course (i.e. to have attended through the semester, performed the activities and passed the evaluation of Unit 4) in order to the student to be able to access such an exam. The students that pass the course by using continuous evaluation (see the deliverables to be produced below) will not be required to do any additional exam.

The following deliverables produced by the students will be subject to evaluation:

- Research work, done in groups, on a subject related to the course. Two deliverables will be assessed:
 1. The written document (Technical annex) developed by the students group.
 2. The oral presentation plus the answers to the questions asked by other students and the lecturers during and after the presentation.
- Critical assessment of scientific and technological papers. In this case, the students will be asked to read the documents by their own classmates, and to produce a critical assessment, in a written form, about their content.

The following table summarizes the cumulative assesment weights (out of a total of 10 points) for each evaluated

activity.

Evaluated activity	Unit	Week	Place	Assessment weight
Research work: written documents	1-4	5-16	Others	5.0
Research work: oral presentation	1-4	5-16	Classroom	4.0
Critical assessment of documents	4	17	Others	1.0

Qualification criteria

The following criteria will be considered when assessing each of the evaluated activities:

- **Research work: written document:**

1. Technical correctness, completeness, originality and accuracy. If a formalization language is used (e.g. in the design phase of the project), it has to be semantically and syntactically well used.
2. Presentation: correctness, clarity, grammar, format.

- **Research work: oral presentation.**

1. Execution: clarity, conciseness, correctness, fineness of the presentation to the written document, quality of the auxiliary means (power point slides, use of the blackboard, etc.).
2. Questions: accuracy and correctness when answering to questions.

- **Critical assessment of documents:**

1. The student must be able to understand and critically analyze and evaluate technical documentation by establishing connections with other approaches associated to other technical information previously read.

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
- CERP-IoT - Cluster of European Research Projects on the Internet of Things. Vision and Challenges for Realizing the Internet of Things. June 2018	Bibliography	Available from: www.internet-of-things-research.eu
- IERC - European Research Cluster on the Internet of Thin	Bibliography	Available from: http://www.internet-of-things-research.eu/documents.htm
- IETF: Internet Engineering Task Force. RFC pages	Bibliography	Available from: www.ietf.org/rfc.html
- Internet of Things - New Security and privacy challenges. Rolf H. Weber. ScienceDirect. Computer Law & Security Review 26 (2010) pg 23-30. Ed. Elsevier	Bibliography	Available from: http://www.sciencedirect.com/science/article/pii/S0267364909001939
Broadband Forum	Bibliography	Available from: http://www.broadband-forum.org/
The Internet of Things council	Bibliography	Available from: http://www.theinternetofthings.eu/
Basic papers	Bibliography	- Most of them will be accessible using the international electronic databases to which the UPM is subscribed. - Some of them could be also uploaded to the Moodle space of the course.
Institutional platform	Web resource	Moodle platform space of the course: accessible through the following URL: https://www.upm.es/politecnica_virtual/ (using your e-mail address and password as a UPM student).

8. Other information

8.1. Other information about the subject

IMPORTANT NOTE: The Master's program to which this subject belongs has entered its termination phase. For this reason, all the previous sections of this Study Guide are equal to the last time that the subject was taught. Section "Activities and assessment criteria / Actividades y Criterios de Evaluación" is NOT valid for this academic course. If a student has the right to enroll and enrolls in the subject, there will be one final exam with a theory and a practical part which assesses all the contents of the subject.