



CAMPUS  
DE EXCELENCIA  
INTERNACIONAL

PROCESO DE  
COORDINACIÓN DE LAS  
ENSEÑANZAS PR/CL/001



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

# ANX-PR/CL/001-01

## GUÍA DE APRENDIZAJE

### ASIGNATURA

**593000414 - Ingeniería de servicios y protocolos**

### PLAN DE ESTUDIOS

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

### CURSO ACADÉMICO Y SEMESTRE

2017/18 - Segundo semestre

## Índice

---

### Guía de Aprendizaje

1. Datos descriptivos.....	1
2. Profesorado.....	1
3. Competencias y resultados de aprendizaje.....	2
4. Descripción de la asignatura y temario.....	3
5. Cronograma.....	5
6. Actividades y criterios de evaluación.....	7
7. Recursos didácticos.....	14

## 1. Datos descriptivos

---

### 1.1. Datos de la asignatura

<b>Nombre de la asignatura</b>	593000414 - Ingeniería de servicios y protocolos
<b>No de créditos</b>	5 ECTS
<b>Carácter</b>	Optativa
<b>Curso</b>	Primer curso
<b>Semestre</b>	Segundo semestre
<b>Período de impartición</b>	Febrero-Junio
<b>Idioma de impartición</b>	Castellano
<b>Titulación</b>	59AF - Master Univ. Ing. Sistemas y Servicios para la Sociedad de la Información
<b>Centro en el que se imparte</b>	Escuela Técnica Superior de Ingeniería y Sistemas de Telecomunicación
<b>Curso académico</b>	2017-18

## 2. Profesorado

---

### 2.1. Profesorado implicado en la docencia

<b>Nombre</b>	<b>Despacho</b>	<b>Correo electrónico</b>	<b>Horario de tutorías</b> *
Jose Fernan Martinez Ortega	A-4407	jf.martinez@upm.es	Sin horario. TBD
Ruben Diego Martinez (Coordinador/a)	A4411	ruben.de.diego@upm.es	Sin horario. TBD

\* Las horas de tutoría son orientativas y pueden sufrir modificaciones. Se deberá confirmar los horarios de tutorías con el profesorado.

## 3. Competencias y resultados de aprendizaje

---

### 3.1. Competencias que adquiere el estudiante al cursar la asignatura

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. Resultados del aprendizaje al cursar la asignatura

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

## 4. Descripción de la asignatura y temario

---

### 4.1. Descripción de la asignatura

This 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*), being compulsory in the professional itinerary and optional in the research itinerary of the curriculum. Its 5 ECTS correspond to a total of around 133 hours of student's work, including all activities. Any of the following graduates (or students with demonstrable equivalent knowledge) may access this course the Graduate in Communication Electronics Engineering (Graduado en Ingeniería de Electrónica de Comunicaciones), Graduate in Telecommunication Systems Engineering (Graduado en Ingeniería de Sistemas de Telecomunicación), Graduate in Sound and Image Engineering (Graduado en Ingeniería de Sonido e Imagen), Graduate in Telematic Engineering (Graduado en Ingeniería Telemática).

**Note:** The written material, both the bibliography and the written reports produced by the students, will be in English. If there is at least one student in the classroom who cannot speak Spanish, all the oral presentations, made both by the lecturers and the students, will be in English. Otherwise, it is possible that some oral presentations are made in Spanish.

### 4.2. Temario de la asignatura

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. Cronograma

### 5.1. Cronograma de la asignatura \*

Sem	Actividad presencial en aula	Actividad presencial en laboratorio	Otra actividad presencial	Actividades de evaluación
1	<b>Unit 0</b> Duración: 02:00 LM: Actividad del tipo Lección Magistral  <b>M1 - Presentation of research work (Lect)</b> Duración: 01:00 LM: Actividad del tipo Lección Magistral			
2	<b>Unit 1</b> Duración: 03:00 LM: Actividad del tipo Lección Magistral			
3	<b>Unit 2 and M2 - Group assignment</b> Duración: 03:00 LM: Actividad del tipo Lección Magistral			
4	<b>UNIT 4</b> Duración: 03:00 LM: Actividad del tipo Lección Magistral			
5	<b>Supervision on demand</b> Duración: 03:00 OT: Otras actividades formativas			
6	<b>Supervision on demand</b> Duración: 03:00 OT: Otras actividades formativas			
7				<b>M3 - 10% research work &amp; presentation</b> PG: Técnica del tipo Presentación en Grupo Evaluación continua y sólo prueba final Duración: 03:00  <b>M3- Technical Annex</b> TG: Técnica del tipo Trabajo en Grupo Evaluación continua y sólo prueba final Duración: 00:00
8				
9	<b>Supervision on demand</b> Duración: 03:00 OT: Otras actividades formativas			
10				<b>M4 - 20% research work &amp; presentation</b> PG: Técnica del tipo Presentación en Grupo Evaluación continua y sólo prueba final Duración: 03:00  <b>M4- Technical Annex</b> TG: Técnica del tipo Trabajo en Grupo Evaluación continua y sólo prueba final Duración: 00:00

11	Supervision on demand Duración: 03:00 OT: Otras actividades formativas			
12				<b>M5 - 50% research work &amp; presentation</b> PG: Técnica del tipo Presentación en Grupo Evaluación continua y sólo prueba final Duración: 03:00  <b>M5- Technical Annex</b> TG: Técnica del tipo Trabajo en Grupo Evaluación continua y sólo prueba final Duración: 00:00
13	Supervision on demand Duración: 03:00 OT: Otras actividades formativas			
14				<b>M6 - 80% research work &amp; presentation</b> PG: Técnica del tipo Presentación en Grupo Evaluación continua y sólo prueba final Duración: 03:00  <b>M6- Technical Annex</b> TG: Técnica del tipo Trabajo en Grupo Evaluación continua y sólo prueba final Duración: 00:00
15	Supervision on demand Duración: 03:00 OT: Otras actividades formativas			
16				<b>M7 - 100% research work &amp; presentation</b> PG: Técnica del tipo Presentación en Grupo Evaluación continua y sólo prueba final Duración: 03:00  <b>M7- Technical Annex</b> TG: Técnica del tipo Trabajo en Grupo Evaluación continua y sólo prueba final Duración: 00:00
17				<b>M8 - Critical review (ON-LINE)</b> TI: Técnica del tipo Trabajo Individual Evaluación continua y sólo prueba final Duración: 03:00

Las horas de actividades formativas no presenciales son aquellas que el estudiante debe dedicar al estudio o al trabajo personal.

Para el cálculo de los valores totales, se estima que por cada crédito ECTS el alumno dedicará dependiendo del plan de estudios, entre 26 y 27 horas de trabajo presencial y no presencial.

\* El cronograma sigue una planificación teórica de la asignatura y puede sufrir modificaciones durante el curso.



## 6. Actividades y criterios de evaluación

### 6.1. Actividades de evaluación de la asignatura

#### 6.1.1. Evaluación continua

Sem.	Descripción	Modalidad	Tipo	Duración	Peso en la nota	Nota mínima	Competencias evaluadas
7	M3 - 10% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	2%	/ 10	CB6 CB7 CE.1 CE.7
7	M3- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	5%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
10	M4 - 20% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	3%	/ 10	CB6 CB7 CE.1 CE.7
10	M4- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	10%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
12	M5 - 50% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	10%	/ 10	CB6 CB7 CE.1 CE.7
12	M5- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	10%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3

14	M6 - 80% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	10%	/ 10	CB6 CB7 CE.1 CE.7
14	M6- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	10%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
16	M7 - 100% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	15%	/ 10	CB6 CB7 CE.1 CE.7
16	M7- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	15%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
17	M8 - Critical review (ON-LINE)	TI: Técnica del tipo Trabajo Individual	Presencial	03:00	10%	/ 10	CB6 CE.7 CESE.3

### 6.1.2. Evaluación sólo prueba final

Sem	Descripción	Modalidad	Tipo	Duración	Peso en la nota	Nota mínima	Competencias evaluadas
7	M3 - 10% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	2%	/ 10	CB6 CB7 CE.1 CE.7
7	M3- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	5%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
10	M4 - 20% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	3%	/ 10	CB6 CB7 CE.1 CE.7
10	M4- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	10%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3

12	M5 - 50% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	10%	/ 10	CB6 CB7 CE.1 CE.7
12	M5- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	10%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
14	M6 - 80% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	10%	/ 10	CB6 CB7 CE.1 CE.7
14	M6- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	10%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
16	M7 - 100% research work & presentation	PG: Técnica del tipo Presentación en Grupo	Presencial	03:00	15%	/ 10	CB6 CB7 CE.1 CE.7
16	M7- Technical Annex	TG: Técnica del tipo Trabajo en Grupo	No Presencial	00:00	15%	/ 10	CESE.4 CB6 CB7 CB10 CE.1 CE.7 CESE.3
17	M8 - Critical review (ON-LINE)	TI: Técnica del tipo Trabajo Individual	Presencial	03:00	10%	/ 10	CB6 CE.7 CESE.3

### 6.1.3. Evaluación convocatoria extraordinaria

No se ha definido la evaluación extraordinaria.

## 6.2. Criterios de evaluación

### 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:
  - o The written report developed by the students group.
  - o 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:**

- o 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.

- o Presentation: correctness, clarity, grammar, format.

- **Research work: oral presentation.**

- o 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.).

- o Questions: accuracy and correctness when answering to questions.

- **Critical assessment of documents:**

- o 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.

Information about copy or plagiarism

In case of copy or plagiarism in any exam, evaluation test or activity, the student or students involved will be grade

with zero. The subject steering committee or the department head could report to the Rector of the university in order to take the disciplinary measurements.

**Note:** Rights and Obligations of the University Students will be find out in the RD 1791/2010 of 30th of December.

#### Information about communications devices

It is not allowed to use communications devices during, both exams or tests, and lectures.

## 7. Recursos didácticos

### 7.1. Recursos didácticos de la asignatura

Nombre	Tipo	Observaciones
- CERP-IoT - Cluster of European Research Projects on the Internet of Things. Vision and Challenges for Realizing the Internet of Things. March 2010	Bibliografía	Available from: <a href="http://www.internet-of-things-research.eu">www.internet-of-things-research.eu</a>
- IERC - European Research Cluster on the Internet of Thin	Bibliografía	Available from: <a href="http://www.internet-of-things-research.eu/documents.htm">http://www.internet-of-things-research.eu/documents.htm</a>
- IETF: Internet Engineering Task Force. RFC pages	Bibliografía	Available from: <a href="http://www.ietf.org/rfc.html">www.ietf.org/rfc.html</a>
- Internet of Things - New Security and privacy challenges. Rolf H. Weber. ScienceDirect. Computer Law & Security Review 26 (2010) pg 23-30. Ed. Elsevier	Bibliografía	Available from:  <a href="http://www.sciencedirect.com/science/article/pii/S0267364909001939">http://www.sciencedirect.com/science/article/pii/S0267364909001939</a>  
Broadband Forum	Bibliografía	Available from: <a href="http://www.broadband-forum.org/">http://www.broadband-forum.org/</a>



The Internet of Things council	Bibliografía	Available from: <a href="http://www.theinternetofthings.eu/">http://www.theinternetofthings.eu/</a>
Basic papers	Bibliografía	- 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	Recursos web	Moodle platform space of the course: accessible through the following URL: <a href="https://www.upm.es/politecnica_virtual/">https://www.upm.es/politecnica_virtual/</a> (using your e-mail address and password as a UPM student).