



UNIVERSIDAD
POLITÉCNICA
DE MADRID



LEARNING GUIDE

COMMUNICATIONS LABORATORY

MÁSTER EN INGENIERÍA DE TELECOMUNICACIÓN

ACADEMIC YEAR	CODE	COURSE	CREDITS	TYPE	SEMESTER
2026-27	93001386	2	5 ECTS	OPTIONAL/ ELECTIVE	SECOND SEMESTER
LANGUAGE		ASSIGNED CENTER			
ENGLISH, SPANISH		E.T.S. DE INGENIEROS DE TELECOMUNICACION			
ASSIGNED DEPARTMENT					
SEÑALES, SISTEMAS Y RADIOCOMUNICACIONES					

COORDINATOR

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REQUIRED PREREQUISITES

REQUIRED COURSES

RECOMMENDED PRIOR KNOWLEDGE

RECOMMENDED COURSES

- (93001368)

OTHER RECOMMENDATIONS

Students should have taken "Communications Systems" in the previous semester, and also take the "Multimedia Communications" course in the same semester, since some practical exercises are related to them.

RESULTS

RD-822/2021

Knowledge

KG1 Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

Skills

HG2 Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

HE1 Capacidad para aplicar métodos de la teoría de la información, la modulación adaptativa y codificación de canal, así como técnicas avanzadas de procesamiento digital de señal a los sistemas de comunicaciones y audiovisuales

Competences

CG4 Que los estudiantes sepan comunicar sus conclusiones ¿y los conocimientos y razones últimas que las sustentan¿ a públicos especializados y no especializados de un modo claro y sin ambigüedades

CG5 Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo

CE2 Capacidad para desarrollar sistemas de radiocomunicaciones: diseño de antenas, equipos y subsistemas, modelado de canales, cálculo de enlaces y planificación

CT4 Capacidad para trabajar de forma efectiva como individuo, organizando y planificando su propio trabajo, de forma independiente o como miembro de un equipo

CE6 Capacidad para modelar, diseñar, implantar, gestionar, operar, administrar y mantener redes, servicios y contenidos

CE4 Capacidad para diseñar y dimensionar redes de transporte, difusión y distribución de señales multimedia

DESCRIPTION

The subject is structured in a set of eight laboratory practices. The theoretical content necessary to carry them out is taught in some cases in the subjects "Communications Systems" and "Multimedia Communications", of the same year of the Master's Degree. For the other cases, some introductory classes have been included in the subject.

In the practices, different aspects related to communications are studied, including basic aspects of radio communication such as the use of OFDM, modulation and channel coding, the application of these concepts in various mobile, wireless and broadcasting communications systems, the processing of technical data in the context of the operation and optimization of mobile networks, and finally video coding and its transmission in real time and videoconferencing, as very relevant use cases in the current context.

The evaluation of the subject is based on the evaluation of each of the practices, in accordance with the procedures explained in this guide.

TOPICS

1. Data analysis in mobile networks
2. Measurement of OFDM signals - 1
3. Measurement of OFDM signals - 2
4. Measurement of DVB-T signals
5. Measurement of LTE and NR terminals
6. Measurement of Wi-Fi networks
7. Video Encoding Fundamentals: From Motion Prediction to Hybrid Encoder
8. Real-time video streaming and video conferencing

ACTIVITIES



Assessment activity



Learning activity

 Introductory lectures for practices 2-6				WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E															
FORMAT	TOTAL DURATION	LOCATION	GROUP																
In-person	10h 30m	Classroom (scheduled)	Normal																
TOPICS																			
				T2 T3 T4 T5 T6															
METHODOLOGY																			
				Lecture															

 Practice 1				WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E															
FORMAT	TOTAL DURATION	LOCATION	GROUP																
In-person	03h 30m	Laboratory	Reduced																
TOPICS																			
				T1															
METHODOLOGY																			
				Laboratory assignments Lecture															

 Practices 2-6				WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E															
FORMAT	TOTAL DURATION	LOCATION	GROUP																
In-person	17h 30m	Laboratory	Reduced																
TOPICS																			
				T2 T3 T4 T5 T6															
METHODOLOGY																			
				Laboratory assignments															

 Exam on practices 1-6				WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E															
FORMAT	TOTAL DURATION	LOCATION	ASSESSMENT	WEIGHT	MINIMUM GRADE														
In-person	03h 30m	Exam Classroom	Progressive	46.67%	4														
TOPICS																			
						T1 T2 T3 T4 T5 T6													
METHODOLOGY																			
						Written exam													
ASSESSED OUTCOMES																			
						KG1 HG2 HE1 CG4 CG5 CT4 CE2													

Delivery of reports of practices 1-6		WEEKS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	E
FORMAT	TOTAL DURATION	ASSESSMENT	WEIGHT	MINIMUM GRADE													
Not in person, without teacher	12h 00m	Progressive	20%	4 Non-rec.													
RECOVERABLE	JUSTIFICATION																
No	Laboratory practices require the use of specialized instrumentation, so they can only be carried out during laboratory schedules in which such instrumentation is made available to students, during the teaching term. Some recovery sessions will be included during this period for justified absences.																
TOPICS																	
T1 T2 T3 T4 T5 T6																	
METHODOLOGY																	
Work in group																	
ASSESSED OUTCOMES																	
KG1 HG2 HE1 CG4 CG5 CT4 CE2																	

Practices 7-8		WEEKS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	E
FORMAT	TOTAL DURATION	LOCATION	GROUP														
In-person	10h 30m	Laboratory	Reduced														
TOPICS																	
T7 T8																	
METHODOLOGY																	
Laboratory assignments																	

Evaluation of practices 7-8		WEEKS															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	E
FORMAT	TOTAL DURATION	LOCATION	ASSESSMENT	WEIGHT	MINIMUM GRADE												
In-person	00h 30m	Laboratory	Progressive	33.33%	4 Non-rec.												
RECOVERABLE	JUSTIFICATION																
No	Laboratory practices require the use of specialized instrumentation, so they can only be carried out during laboratory schedules in which such instrumentation is made available to students.																
TOPICS																	
T7 T8																	
METHODOLOGY																	
Written exam																	
ASSESSED OUTCOMES																	
KG1 HG2 HE1 CG4 CG5 CT4 CE4 CE6																	


Global assessment

WEEKS
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 **E**

FORMAT In-person	TOTAL DURATION 03h 00m	LOCATION Exam Classroom	ASSESSMENT Global, Retake (Extraordinary)	WEIGHT 100%	MINIMUM GRADE 5
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TOPICS

T1 T2 T3 T4 T5 T6 T7 T8

METHODOLOGY

Written exam Work in group

ASSESSED OUTCOMES

KG1 HG2 HE1 CG4 CG5 CT4 CE2 CE4 CE6

WEEKLY SCHEDULE

 Assessment activity
  Learning activity
  Week with activity
  Exam period

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	E
 Introductory lectures for practices 2-6	•	•		•												
 Practice 1			•													
 Practices 2-6					•	•	•	•	•							
 Exam on practices 1-6										•						
 Delivery of reports of practices 1-6					•	•	•	•	•	•						
 Practices 7-8											•	•	•			
 Evaluation of practices 7-8											•	•	•			
 Global assessment																•

ASSESSMENT CRITERIA

General criteria

The final grade of the subject will be the average of the marks obtained in each of the practices, weighted by their duration in weeks. For this reason, the mark of practice 7 will have a double weight than the others, since its duration is two weeks instead of the usual one week.

Each of the practices 1-6 will require the delivery of a report by the group of students who carry it out together. There will also be exams on all practices.

The completion of the practices is mandatory. A maximum of one unjustified absence is allowed, which will mean that this practice is graded with a 0. Recovery schedules will be established at the end of the semester for those students who have justified absences.

Students who carry out the practices in the established period will not have to do it again in the following year, if they do not pass the subject.

If the student does not pass the threshold grade required for any activity, their final grade will be the minimum between the final grade obtained by averaging the grades and 4.5.

Assessment criteria for the regular exam period. Progressive assessment

Assessment criteria

The general criteria apply. There will be a midterm exam covering practical sessions 1-6, which will take place during the semester. Practices 7-8 will be assessed through questionnaires carried out at the end of the scheduled practical session.

Activities

- Exam on practices 1-6 (46.67%)
- Delivery of reports of practices 1-6 (20%)
- Evaluation of practices 7-8 (33.33%)

Assessment criteria for the regular exam period. Global assessment

Assessment criteria

The general criteria apply. A global assessment will be carried out, which will include an exam covering all practices and the submission of any pending reports for practices 1-6.

The percentages assigned to each component of the evaluation will be the same as in the progressive evaluation.

Activities

- Global assessment (100%)

Assessment criteria for the retake (extraordinary) exam period

Assessment criteria

The general criteria apply. A global assessment will be carried out, which will include an exam covering all practices and the submission of any pending reports for practices 1-6.

The percentages assigned to each component of the evaluation will be the same as in the progressive evaluation.

Activities

- Global assessment (100%)

RESOURCES

Equipment

Equipamiento y software disponible en los laboratorios docentes del Departamento
Instrumentation and software needed for carrying out the practices

Other resources

Documentación disponible en: <https://www.moodle.upm.es>
Documentation provided by the course professors through the UPM Moodle platform

SUSTAINABLE DEVELOPMENT GOALS



Industry, Innovation and
Infrastructure

OTHER INFORMATION

Students will complete their practices in groups of 2-3, which will be organized at the beginning of the semester.

Practices 2-6 will be carried out jointly. Due to the limited number of available positions, students will carry out these practices in a different order, following the schedule that will be published later.



The asynchronous communication between professors and students will be held using the tools provided by UPM: Moodle and institutional email as the preferred means for communications, and Teams and Zoom as collaborative tools for meetings and private communication with students. Students are assumed to check regularly their institutional email accounts and the information published in Moodle.