Syllabus
2025 - 2026

GENERAL INFORMATION

Data of the subject

Subject name	Communications Systems II
Subject code	DEAC-MIT-526
Mainprogram	Official Master´s Degree in Telecommunications Engineering
Involved programs	Máster Universitario en Ingeniería de Telecomunicación y Mást. Univ. en Administración de Empresas [First year] Máster Universitario en Ingeniería de Telecomunicación [First year] Máster Universitario en Ingeniería de Telecomunicación y Máster en Ciberseguridad [First year] Máster Universitario en Ingeniería de Telecomunicación + Máster in Smart Grids [First year]
Level	Postgrado Oficial Master
Quarter	Semestral
Credits	6,0 ECTS
Type	Obligatoria
Department	Department of Electronics, Control and Communications
Coordinator	Wsewolod Warzanskyj García
Office hours	Appointment on request

Teacher Information

Teacher

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Teacher

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DESCRIPTION OF THE SUBJECT

Contextualization of the subject

Prerequisites

Knowledge of digital systems, electronics and basics of communication systems, communication electronics and radiowave propagation

Course contents

Contents

Theory

Theory

Chapter 1: Introduction and basic concepts

1. History of radio broadcasting
2. Basic concepts of mobile communications
3. Mobile communication systems, Wi-Fi, sensor networks and IoT

Chapter 2: Mobile communication systems

2.1 GSM-EDGE

2.2 4G (I): Definition and UMTS

2.3 4G (II): LTE

2.4 Appendix: (I) MIMO, (II) Network planning, (III) Mention to security

2.5 From 4G to 5G

Chapter 3: Terrestrial broadcassting systems and Wi-Fi

3.1 Audio and television broadcasting systems

3.2 Wi-Fi - IEEE 802.11

Chapter 4: Special systems

4.1 Satellite radio links (I y II)

4.2 Satellite television: DVB-S(2)

4.3 Introduction to RADAR

4.4 GNSS (Global Navigation Satellite Systems) and other radio location and radio navigation systems

Laboratory

Laboratory

In depth study of radio communication aspects described in the theory sessions.

It covers the following aspects:

- Spectrum of radio broacasting signals
- Practical considerations and limitations of OFDM modulation systems (optional)
- Practical considerations and limitations of MIMO systems
- Fundamentals of communication satellite orbits
- Fundamentals of satellite geolocation
- Fundamentals of sensor networks (IoT).

For every laboratory activity the student will present a report

EVALUATION AND CRITERIA

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight
Mid term exam: 10% Final exam: 45%	• Concept comprehension • Application of concepts to solve practical problems • Analysis and evaluation of results obtained in exercise solutions • Written communication skills and presentation of results	55
Research work	• Focus on physical layer aspects • Identification of the main information elements in the work subject • Work breakdown among the different elements as a function of each element relative importance • Narrative quality and pedagogical focus • Reference identification	25
• Lab activities • Lab exam (optional)	• Concept comprehension • Application of concepts to the solution of practical problem	20

Grading

Class attendance is compulsory, according to article 93 of ICAI academic regulations. Attendance requirements will be applied in an independent way to theory and laboratory sessions:

- In the case of theory sessions, non compliance of the norm can prevent being examined in ordinary examination call.
- In the case of laboratory sessions, non compliance of the norm can prevent being examenind in ordinary and extraordinary calls. In any case, non justified absence to laboratory sessions will be penalized in the evalution of activities.

Grades in **ordinary call** are obtained as follows:

- Theory and research work report. 80% of the overall subject grade, broken down as final exam grade, 45%, mid term exam grade, 10%, and research work report, 25%.
- Laboratory. 20% of the overall subject grade. It includes performing complete activities, presentation of specific reports on activity results and, if the professor considers it appropriate, individual or work group evalutions.

To pass the subject in ordinary call, both the final exam and laboratory grades must be greater or equal to 5.

Grading in **extraordinary call** follows the same criteria as in the ordinary call, in the sense that partial grades are retained till they are replaced, where appropriate, by new grades in the extraordinary call.

- Final exam: it has to be repeated if in the ordinary call its mark was below 5
- Laboratory activities: if the overall laboratory mark is below 5 the student will submit, after the ordinary call final exam and at least 48 hours before the date of the final exam in extraordinary call, a new report of the laboratory activities the student considers appropriate, chosen among the ones that are failed (mark below 5).
- Research work report: if the student has to attend the extraordinary call, either as final exam or submission of laboratory activity reports, and the grade of the research work report is below 5, the student can voluntarily submit a second version of the modelling work report. The submission has to take place after the ordinary call final exam and at least 48 hours before the date of the final exam in extraordinary call.

WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Performance evaluation tests		
Final exam	Final exam dates to be announced in time	
Reading and studying of theory content	After each class session	
Solving of proposed problems	Weekly	
Exam preparation	March and May	
Laboratory activity reports	Week after the end of the laboratory activity	

BIBLIOGRAPHY AND RESOURCES

Basic References

Subject documentation in Moodle

Additional references

- Stefania Sesia et al, "LTE, the UMTS long term evolution, from theory to practice", Ed. Wiley (e-book)
- ETSI Standards, http://www.etsi.org/
  - http://www.etsi.org/ : página Web principal
  - http://www.etsi.org/standards-search#page : especificaciones, con herramienta de búsqueda
- 3GPP standards
  - http://www.3gpp.org/
  - http://www.3gpp.org/specifications/79-specification-numbering
  - http://www.3gpp.org/ftp/Specs/
- U.S. Government, "Official U.S. government information about the Global Positioning System (GPS) and related topics", http://www.gps.gov/technical/icwg/
- European Space Agencia, ESA, navipedia, https://gssc.esa.int/navipedia/index.php/Main_Page
- "ITU-T recommendations", http://www.itu.int/pub/R-REC/en
- José María Hernando Rábanos, "Comunicaciones Móviles", Ed. Centro de estudios Ramón Areces