ETSIT
Escuela Técnica Superior de
Ingenieros de Telecomunicación

Wireless Telecommunication Systems (WTS)			
Code number:	45045	Number of ECTS:	6 ECTS
Semester:	Spring	Language:	English

Lecturer(s) and contact:

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Learning goals:

At the end of this course, the student should be able to:

- Know the options to experiment in the field of the radio amateur operation.
- Work with regulations related to the radio frequency spectrum management.
- Work with specifications related to radio telecommunication systems.
- Identify transmissions with spectrum analysis equipment.
- Connect the basic parameters that characterise a radio frequency system.
- Interpret the technology involved in the radio telecommunication systems.
- Estimate the radio coverage in point-to-point systems.
- Enumerate and describe the communication systems studied.
- Identify the planning requirements in terms of time and resources to develop projects

Contents:

1. AN INTRODUCTION TO RADIO:
   Concept revision. Logarithmic units. The radio frequency spectrum. Radio amateur operation as a way to experiment.
2. ANTENNA SYSTEMS TECHNOLOGY:
   Review of characteristics and parameters defining the antennas. Antenna feeders. Antennas applied to communication systems.
3. RECEIVERS AND TRANSMITTERS:
   Receivers technology. Transmitters technology. Interpreting transceiver wiring diagrams. The evolution of the radio. Software defined radio (SDR).
4. RADIO BROADCASTING:
   Amplitude modulation (AM) radio broadcasting. Frequency modulation (FM) and FM-stereo radio broadcasting. Digital broadcasting: RDS y DAB. Modulating in DAB. OFDM.
5. RADIO LINKS AND SATELLITE COMMUNICATIONS:
   Introduction and satellite orbits. Parameters that influence the communication: the link budget. Types of satellites. Satellites and radio amateur operation. Related modulating schemas: FSK and PSK. Radio links. Coverage estimation with software.
6. CELLULAR TELECOMMUNICATIONS:
   Basic standards. Second generation (2G): GSM, GPRS and EDGE. Modulations related to 2G. MSK, GMSK. Third generation (3G) and subsequent generations. UMTS, LTE, 5G. Modulations related to 3G and subsequent generations. Spread spectrum.
7. SHORT-RANGE WIRELESS DATA COMMUNICATIONS:
   Bluetooth. IEEE 802.11 – ISO/IEC 8802-11 (Wi-Fi). Other technologies.

Prerequisites:

It will be very helpful some basic knowledge about electronics to understand schemas, and ability to

understand the concept of electromagnetic waves and its location in the radio frequency spectrum. For the applied part of the subject, it will be helpful some basic knowledge of the laboratory of electronic instrumentation (oscilloscope, multimeter, function generator), reasonable manual skills and being resourceful to build small prototypes.
Assessment: Final exam (60%), reports and demonstration of a laboratory project (30%), regular in-class activities (10%).