Program	59SC – Telecommunications Systems Engineering B. Eng.

Course number and name	
Number	595010342
Name	Mobile Communications
Semester	S7 [(September-January)]

Credits and contact hours	
ECTS Credits	4,5
Contact hours	46

Coordinator's name	Pérez Yuste, Antonio [antonio.perez@upm.es]

Specific course information
Description of course content
This course is intended for senior undergraduate students in telecommunication systems engineering who wish to be acquaintance with the state of the art on both modern mobile communication systems, like LTE and 5G, and broadband wireless data networks, like WiFi and Bluetooth. Fundamental concepts of cellular systems, mobile wireless channel, and wireless networks and systems will be examined. A number of practical abilities will be developed through some hands-on guided activities.
List of topics to be covered
Theory classes T1. Introduction to wireless communications T2. Cellular systems foundations T3. The wireless channel T4. Broadband mobile communication systems: 3G-UMTS T5. Broadband mobile communication systems: 4G-LTE T6. The Road to 5G T7. Broadband wireless data networks Workshop classes W1. Wireless spectrum for mobile communications in Spain W2. Radio planning using XIRIO Laboratory classes L1. LTE Vienna Simulator L2. WiFi Measurements with Ekahau
Prerequisites or co-requisites
– Signal and Systems

- Theory of Communications
- Wave Transmission and Propagation
- Telecommunication Systems

Course category in the program	
__ R (required)	**_X_ E (elective)** *(elective courses may not be offered every year)*

Specific goals for the course

Specific outcomes of instruction

RA284 – Design and planning of systems and networks for wireless communications.
RA285 – Use of processes and techniques of measurement and characterization of these systems and of the involved communication components.
RA281 – Calculation of the link balances and of the wireless communications systems quality.
RA282 – Description and comparison of the main wireless digital communication systems in Europe (TETRA, GSM/GPRS, UMTS, LTE), including the architecture, the services, the interfaces and the layers (specially the radio interface).
RA283 – Analysis of the structure of bursts and correlations and of the codification and modulation processes.
RA280 – Analysis and simulation of a mobile channel and of the propagation models.

Further reading and supplementary materials

Textbooks:

- Rappaport, T.S., “Wireless Communications: Principles and Practice”, Ed, Prentice-Hall, 2nd ed, 2002.
- Cox, C., “Essentials of UMTS”, Ed. Cambridge University Press, University of Cambridge, 2008.
- Du, K.L and Swamy, M.N.S., “Wireless Communication Systems”, Ed. Cambridge University Press, New York, 2010.
- Dahlman, E. et al., “4G: LTE/LTE-Advanced for Mobile Broadband”, Ed. Academic Press, 2nd ed, 2013.
- Hernando Rábanos, J.M. et al., “Comunicaciones Móviles”, Ed. Centro de Estudios Ramón Areces, 3rd ed, Madrid, 2015.
- Dahlman, E. et al., “5G NR: The Next Generation Wireless Access Technology”, Ed. Academic Press, 2018.

Webpages:

- The International Telecommunications Union (ITU): http://www.itu.int
- The 3rd Generation Partnership Project (3GPP): http://www.3gpp.org/
- IEEE 802.11 wireless local area networks (IEEE): http://www.ieee802.org/11/
- IEEE Xplore Digital Library (IEEExplore): https://ieeexplore.ieee.org/Xplore/home.jsp
- Safari O’Reilly Library for Higher Education (O’Reilly): https://www.oreilly.com/library/view/temporary-access/

Teaching methodology			
_X_ **lectures**	__ **problem solving sessions**	__ **collaborative actions**	_X_ **laboratory sessions**
Other:	Moodle online platform is used in this course and represents the main resource for students. Absolutely all the information and materials, as well as the evaluation tools, can be found in this site. Theory classes are given in a standard classroom, while lab practices are conducted both on-site at special department facilities or at a distance by using specific software.		