

230629 - WAS - Waves and Systems

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
 Teaching unit: 739 - TSC - Department of Signal Theory and Communications
 Academic year: 2015
 Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
 ECTS credits: 5 Teaching languages: English

Teaching staff

Coordinator: Cardama Aznar, Angel; Jofre Roca, Luis
 Others: Cardama Aznar, Angel; Jofre Roca, Luis

Learning objectives of the subject

Study load

Total learning time: 125h	Hours large group:	39h	31.20%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	86h	68.80%

230629 - WAS - Waves and Systems

Content

(ENG) 1. The EM spectrum. Communications and sensing. System and channel models	Learning time: 3h Theory classes: 3h
(ENG) 2. Radiation theory: retarded field and moving charges	Learning time: 3h Theory classes: 3h
(ENG) 3. Radiometry and radioastronomy: brightness models and laws, radiotelescopes	Learning time: 3h Theory classes: 3h
(ENG) 4. Wave solutions in time and frequency domains: wave equations, modes and fields	Learning time: 3h Theory classes: 3h
(ENG) 5. Wave polarization and polarimetry: Poincaré sphere, polarization scattering matrix	Learning time: 3h Theory classes: 3h
(ENG) 6. Waves in matter. Conductors, superconductors, dielectrics, ferroelectric	Learning time: 3h Theory classes: 3h
(ENG) 7. Interaction of the EM waves with the human body: Energy and human metabolism.	Learning time: 3h Theory classes: 3h
(ENG) 8. Fourier wave fields.: Propagation and imaging, Diffraction theorem consequences	Learning time: 3h Theory classes: 3h

230629 - WAS - Waves and Systems

(ENG) 9. Wave propagation: Reflexion, diffraction, scattering, 2-way model,	Learning time: 3h Theory classes: 3h
(ENG) 10. Time and frequency-variant radio channels: narrow and broadband models	Learning time: 3h Theory classes: 3h
(ENG) 11. Transmitting and receiving antennas: circuital and radiation parameters, feeding	Learning time: 3h Theory classes: 3h
(ENG) 12. Arrays and multi-antenna geometries: antenna and channel models	Learning time: 3h Theory classes: 3h
(ENG) 13. Ultra wideband antennas: standards, antenna and channel models, impulse response	Learning time: 3h Theory classes: 3h
(ENG) 14. Free space optical systems: ray optics, Gaussian beams, laser applications	Learning time: 3h Theory classes: 3h

230629 - WAS - Waves and Systems

Bibliography

Basic:

Staelin, D. Receivers, antennas, and signals [on line]. MIT, 2003 [Consultation: 17/02/2012]. Available on: <<http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-661-receivers-antennas-and-signals-spring-2003/>>.

Martone, M. Multiantenna digital radio transmission. Boston [etc.]: Artech House, 2002. ISBN 1580533183.

Complementary:

Orfanidis, S.J. Electromagnetic waves and antennas [on line]. Piscataway, NJ: ECE Department, 2008 [Consultation: 25/02/2015]. Available on: <<http://www.ece.rutgers.edu/~orfanidi/ewa/>>.

Saunders, S.R.; Aragón-Zavala, A. Antennas and propagation for wireless communication systems. 2nd ed. Chichester (UK)[etc.]: John Wiley & Sons, 2007. ISBN 9780470848791.

Cardama, Á. [et al.]. Antenas [on line]. 2a ed. Barcelona: Edicions UPC, 2002 [Consultation: 09/02/2015]. Available on: <<http://hdl.handle.net/2099.3/36797>>. ISBN 8483016257.