

Digital Communications

Grades in English

<http://www.tsc.uc3m.es/~mlazaro/Docencia/DC.html>

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Lecturers

- Theory

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- Laboratory

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Objective of the subject

To study the main methods and techniques applied in digital communication systems

- Tx : Digital modulation formats
 - ▶ Linear modulations
 - ▶ Non-linear modulations (angle modulations)
 - ▶ Multipulse modulations
 - ★ Spread spectrum modulations
 - ★ OFDM modulations
- Rx : Design of digital receivers in channels with linear distortion
 - ▶ Simplest receiver: memoryless symbol-by-symbol detector
 - ▶ Optimal receiver: ML sequence detector
 - ▶ Sub-optimal receivers: channel equalizers
- Errors : protection techniques (Channel coding)
 - ▶ Detection and/or correction of errors
 - ★ Block codes
 - ★ Convolutional codes

Organization of the subject

- 0 Introduction
- 1 Pulse amplitude (linear) modulations
- 2 Design of digital communications receivers in the presence of ISI
- 3 Angle modulations (frequency and phase modulations)
- 4 Multipulse modulations
- 5 Channel coding for error protection

Bibliography

Basic bibliography

- A. Artés Rodríguez et al. *Comunicaciones Digitales*, Pearson Educación, 2007
 - ▶ Available on-line: <http://www.tsc.uc3m.es/~antonio/>
- B. Sklar. *Digital communications : fundamentals and applications*, Prentice Hall, 2001
- John G. Proakis. *Digital communications*, McGraw Hill, 3^a ed., 2001

Complementary bibliography

- E. A. Lee, D. G. Messerschmitt. *Digital Communication*, 2^a ed., . Kluwer Academic Publishers, 1994
- S. Benedetto, E. Biglieri. *Principles of Digital Transmission with Wireless Applications*, Kluwer, 1999
- S. Haykin. *Digital Communications*. John Wiley & Sons, 1988

Didactic materials / Tutorials

- Didactic materials

- ▶ Aula Global
- ▶ Web site for the subject

- ★ <http://www.tsc.uc3m.es/~mlazaro/Docencia/DC.html>

- Tutorials

- ▶ Individual tutorials

- ★ Time schedule for tutorials
 - Wednesday 10:00 - 12:00h (preferential)
 - Previous arrangement of the appointment is suggested (arranged meetings will have priority)
 - ★ At other times
 - Previous arrangement (by e-mail)

- ▶ Collective tutorials

- ★ Dates to be confirmed (and announced)

Assessment model

- Continuous assessment option
 - ▶ Continuous assessment (40 %)
 - ★ Partial exams (20 %)
 - 4 partial exams (worst is discarded)
 - ★ Exercises (10 %)
 - 4 hand in's (worst is discarded)
 - ★ Laboratory sessions (10 %)
 - 4 sessions (2 exercises)
 - ▶ Final exam (60 %)
 - ★ Without bibliography
 - ★ With sheets for mathematical expressions
 - 2 A4 sheets (4 pages), original and hand-written: mathematical formulae and diagrams (NOT solved exercises)
 - ★ Minimum required grade: 4 out of 10 points
- Final exam option
 - ▶ Ordinary call: Exam up to 6 points
 - ▶ Extraordinary call: Exam up to 10 points

NOTE: A detailed description of these criteria is available at "[Aula Global](#)" and at the web site