

DEA-GITT-225 Communication Systems

SEMESTER: Spring

CREDITS: 6 ECTS (4 hrs. per week: 3 Theory + 1 Lab, on average, in 2-hour sessions)

LANGUAGE: Spanish

DEGREES: GITT

Course overview

This course aims to provide students with knowledge of analogue and digital communication systems. The signal and the disturbances that accompany the signal, limiting the transmission quality, are analyzed and characterized. The different analog and digital modulation techniques are described, evaluating each one in terms of power and bandwidth requirements, signal to noise ratio and probability of error. The final goal is that students acquire the necessary capabilities to analyze and manage business plans and implementation projects in the field of communications. These capabilities will be based on a mastery of the technical and economic performance of the different modern communication systems and a clear perspective of its future evolution.

Prerequisites

- Knowledge of complex variable, differential and integral calculus and signal theory.
- Circuit analysis and frequency response.
- Theory of electromagnetism basic knowledge.
- Basic knowledge of programming; preferable in Matlab

Course contents

Theory:

1. Introduction
2. Signal Theory and Noise Characterization
3. Continuous Wave Modulation.
4. Sampling and Pulse Modulation.
5. Baseband Digital Transmission.
6. Bandpass Digital Transmission.
7. Commercial Systems.

Laboratory:

Each concepts described previously has at least one associated lab practice (2-hour sessions)

- P1.** Introduction.
- P2.** Amplitude Modulation (Software).
- P3.** Frequency Modulation (Software).
- P4.** Amplitude and Frequency Modulation (Hardware).
- P5.** Bandpass Digital Modulation.
- P6.** Commercial Systems: Orthogonal Frequency Division Multiplexing (OFDM) or Code Division Multiple Access (CDMA).

Textbook

- Communication Systems, 4th Edition. B. Carlson, P.B. Crilly, J.C. Rutledge. McGraw-Hill.
- Sistemas de Comunicación. S. Haykin. Wiley.
- Modern Digital and Analog Communication Systems, 3th edition. B.P. Lathi. Oxford University Press.
- Digital & Analog Communication Systems, 7th edition. Leon W. Couch. Prentice Hall.

Grading

- Final exam accounts for 45% of the final grade (A minimum grade of 5 out of 10 points is required to pass this subject).
- Mid-term exam accounts for 20%.
- Several small exams during the course account for 10% in total.
- Lab reports account for 25% of the grade (A minimum grade of 5 out of 10 points is required to pass this subject).