Course guide
230363 - FSP - Fundamentals of Discrete-Time Signal Processing

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.
Degree: MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2013). (Optional subject).
Academic year: 2022
ECTS Credits: 2.5
Languages: English

LECTURER

Coordinating lecturer: Lamarca Orozco, M. Meritxell

Others:

TEACHING METHODOLOGY

Lectures
Individual work
Matlab simulations

LEARNING OBJECTIVES OF THE SUBJECT

To characterize the application of LTI systems for discrete time signal processing in the time domain. To be able to use the Fourier transform, DFT and z-transform for the characterization of signals and systems. To understand the relationship between an analog signal and its discrete-time representation in A/D and D/A conversion. To learn the characterization of random variables (both scalar and multivariate).

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>16,0</td>
<td>25.60</td>
</tr>
<tr>
<td>Self study</td>
<td>42,5</td>
<td>68.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>4,0</td>
<td>6.40</td>
</tr>
</tbody>
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Total learning time: 62.5 h

CONTENTS

Linear time-invariant systems

Description:
Impulse response. Convolution.
Discrete-time systems characterized by difference equations. FIR and IIR systems.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h
Signals and systems in the frequency domain

Description:
Discrete-time Fourier transform. Definition, properties, examples and applications.
Discrete Fourier Transform (DFT). Definition, properties, examples and applications.

Full-or-part-time: 24h 30m
Theory classes: 6h
Laboratory classes: 2h
Self study : 16h 30m

Z-transform

Description:
Z-transform. Definition, properties, examples.
Transfer function of a LTI system. Relationship with its frequency response.

Full-or-part-time: 12h
Theory classes: 3h
Laboratory classes: 1h
Self study : 8h

Random variables

Description:
Random variable concept. Examples: Bernoulli, uniform, Gaussian, exponential.
Distribution function. Probability density function.
Mean and variance.

Full-or-part-time: 14h 30m
Theory classes: 5h
Laboratory classes: 1h
Self study : 8h 30m

GRADING SYSTEM

Assignments (100%)

BIBLIOGRAPHY

Basic: