UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

DIGITAL SIGNAL PROCESSING

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	ING-INF/03 (TELECOMMUNICATIONS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC ENGINEERING
Curriculum	Space Communication and Sensing
Year of study	2°
Period	1st semester (27/09/2021 - 21/01/2022)
ECTS	6
Lesson hours	45 lesson hours
Language	English
Activity type	ORAL TEST
Teacher	SAVAZZI PIETRO (titolare) - 6 ECTS
Prerequisites	Basic concepts in analog signal processing, spectral analysis and filtering.
Learning outcomes	Developing a strong working knowledge on signal processing algorithms for modeling discrete-time signals, designing optimum digital filters, estimating the power spectrum of a random signal, and designing and implementing linear and nonlinear adaptive filters. Ability to implement the studied algorithms in Matlab standalone and hardware-oriented applications.
Course contents	Introduction to digital signal theory. Discrete time signals, sampling theorem, linear shift invariant digital systems.

	Analysis of digital systems in the Fourier and Z transform domains. Discrete-time random processes. Digital filtering of deterministic and stochastic signals. Deterministic and stochastic signal modeling, Spectrum estimation. Wiener Filter: linear prediction, white noise filtering, unwanted signal canceling. Linear and Nonlinear Adaptive filtering: LMS, RLS and Kalman algorithms, neural networks. Application examples in Matlab and programmable hardware platforms.
Teaching methods	The course is based on lectures, case studies, and project examples, aimed at describing applications of statistical digital signal processing to practical utility projects. Lectures (hours/year in lecture theatre): 45
Reccomended or required readings	Monson H. Hayes: Statistical Digital Signal Processing and Modeling. John Wiley & Sons Inc. Simon O. Haykin: Adaptive Filter Theory, Pearson.
Assessment methods	The exam consists of an oral test during which three/four questions will be asked on different topics regarding the main course objectives, i.e., signal modeling, adaptive filtering, and spectrum estimation, in order to cover most of the course topics. Moreover, each student can choose to implement a laboratory project, assigned by the teacher, followed by the oral test. The assigned projects will replace one of the oral questions of the final test. The final mark is in thirtieths.
Further information	
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile