



### DIGITAL SIGNAL PROCESSING

<b>Anno immatricolazione</b>	2020/2021
<b>Anno offerta</b>	2021/2022
<b>Normativa</b>	DM270
<b>SSD</b>	ING-INF/03 (TELECOMUNICAZIONI)
<b>Dipartimento</b>	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
<b>Corso di studio</b>	ELECTRONIC ENGINEERING
<b>Curriculum</b>	Space Communication and Sensing
<b>Anno di corso</b>	2°
<b>Periodo didattico</b>	Primo Semestre (27/09/2021 - 21/01/2022)
<b>Crediti</b>	6
<b>Ore</b>	45 ore di attività frontale
<b>Lingua insegnamento</b>	English
<b>Tipo esame</b>	ORALE
<b>Docente</b>	SAVAZZI PIETRO (titolare) - 6 CFU
<b>Prerequisiti</b>	Basic concepts in analog signal processing, spectral analysis and filtering.
<b>Obiettivi formativi</b>	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.
<b>Programma e contenuti</b>	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.

#### Metodi didattici

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

#### Testi di riferimento

Monson H. Hayes: Statistical Digital Signal Processing and Modeling. John Wiley & Sons Inc.

Simon O. Haykin: Adaptive Filter Theory, Pearson.

#### Modalità verifica apprendimento

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.

#### Altre informazioni

#### Obiettivi Agenda 2030 per lo sviluppo sostenibile

[Gli obiettivi](#)