Progettazione Mixed Signal
(Design of Mixed Signal Circuits and Systems)

CFU: 9 (90 ore)

A.A. 2023-2024

Teachers:	Ore
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The Sensor Systems Engineering program (15 CFU)

Curriculum: **Sensor System Engineering**

- ❑ Sistemi sensoriali per l'automazione, l'ambiente e la salute (6 cfu)
- ❑ Progettazione *mixed signa*l (9 cfu)

- ❑ **Design of integrated cells for:**
  - Sensor interfacing
  - Analog control systems
  - Analog signal processing
- ❑ **Data conversion (ADCs & DACs)**
- ❑ **Digital and Analog circuit integration**

Main Topics (not in chronological order)

1) High level description of a collection of fundamental Analog and Mixed Signal (AMS) systems:

- DAS (Data Acquisition Systems) and elementary sensor interfaces
- Methods for offset and flicker noise cancellation
- Fully-differential architectures
- Analog Integrated Filters
- Data converters (ADC-DAC)

2) Complement of Mixed Signal Analysis & Design Methods

- Design friendly MOSFET and BJT noise models
- Useful network theorems (feedback system design, parameter variation effects, ...)
- Mixed Signal design flow

3) Transistor level Analysis & Design of main analog cells

- Elementary blocks: Switches and Current Mirrors
- Operational amplifiers (S/E and Fully-Differential)
- Integrated Comparators

Experimental Lectures

1) Design and Simulation of a few important analog blocks (LTSpice)
2) Experiments performed by the teacher with dedicated analog circuits and computer-controlled oscilloscopes / signal generators

Final Exam

1) Only oral: typically, two questions (transistor-level topic + system level topic)

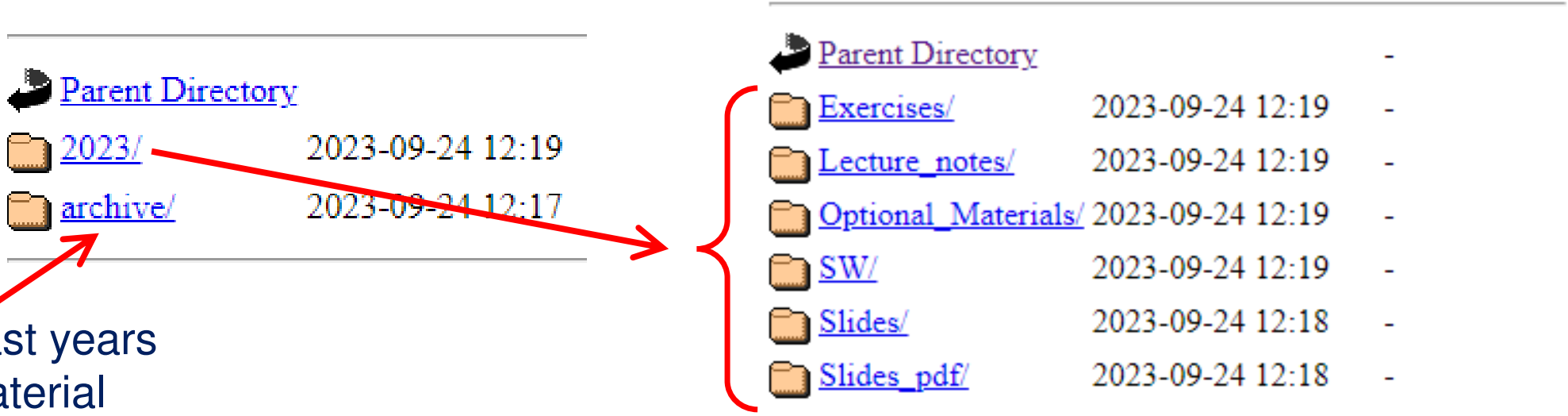
Suggested Prerequisites

1) Progettazione di Sistemi Microelettronici (PSM)
2) Elettronica Analogica

Didattic material

From teacher's web page: (http://www2.ing.unipi.it/~a008309)

→ http://www2.ing.unipi.it/~a008309/mat_stud/lista_dida.html



Past years material

This-year material
(will be made available progressively)