

MICRO-710 **PLLs and clock & data recovery**

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Cursus	Sem.	Type
Electrical Engineering		Opt.
Microsystems and Microelectronics		Opt.

Language of teaching	English
Credits	2
Session Exam	Written & Oral
Workload	60h
Hours	28
Courses	28
Number of positions	

Remark

May 3 to 14, 2021 - Online

Summary

The course is covering following aspects: Fundamentals of Analog PLLs, Interference Effects, Deadzone and Phase Noise, VCO Design, All-Digital PLL Architecture and Implementation, Digitally-Controlled Oscillator, Time-to-Digital Converter, RC-Oscillators, Designing XTAL and MEMS Oscillator.

Content**Day 1:**

- Fundamentals of Analog PLLs
- Interference Effects in PLLs
- Spiral Inductor Interference, Deadzone and Phase Noise

Day 2:

- VCO Design
- Jitter and Phase Noise in PLLs

Day 3:

- All-Digital PLL Architecture and Implementation
- Digitally-Controlled Oscillator (DCO)
- Time-to-Digital Converter (TDC)

Day 4:

- Oscillator Basics: Feedback and Power Consumption
- RC-Oscillators
- Designing XTAL and MEMS Oscillator from MHz to GHz
- Low Phase Noise and Low Jitter 0.1-10GHz VCO

Day 5:

- Fractional-N PLLs for Frequency Synthesis
- FDC-Based Digital PLLs

Keywords

Clock Recovery, PLL, VCO Circuits, Oscillators, Transceivers

Learning Prerequisites**Recommended courses**

Analog IC Design

Resources**Ressources en bibliothèque**

- [Analog-to-Digital Conversion / Pelgrom](#)
- [Structured Analog CMOS Design / Kayal](#)
- [Understanding delta-sigma data converters / Schreier](#)
- [Understanding Delta-Sigma Data Converters / Pavan](#)
- [RF analog impairments modeling for communication systems simulation : application to OFDM-based transceivers / Smaini](#)
- [All-Digital Frequency Synthesizer in Deep-Submicron CMOS / Staszewski](#)
- [Charge-Based MOS Transistor Modeling: The EKV Model for Low-Power and RF IC Design / Enz](#)
- [Analog Design Essentials / Sansen](#)
- [Methodology for the Digital Calibration of Analog Circuits & Systems / Kayal](#)