

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

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

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

**Remark**

June 25 to 29, 2018

**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

**Note**

\* Organized by MEAD/EPFL  
 More informations & registration at:  
<http://mead.ch/MEADNEW/plls-and-oscillators/>  
 Contact: education@mead.ch

**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](#)
- [Methodology for the Digital Calibration of Analog Circuits & Systems / Kayal](#)
- [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](#)
- [RF analog impairments modeling for communication systems simulation : application to OFDM-based transceivers / Smaini](#)