## Virtual Exchange Program

# COM-303: Signal processing for communications

**Start date:** 17/02/2020, **End date:** 29/05/2020
**Platform:** Coursera

## Ecole Polytechnique Fédérale de Lausanne

### COURSE SYNOPSIS

**Domain:** Physics

**Title(s) of the course(s) as it appears on the platform:** Digital Signal Processing

**Language (ISO-639-1 code):** en

**Short description of the course:** Students learn digital signal processing theory, including discrete time, Fourier analysis, filter design, adaptive filtering, sampling, interpolation and quantization; they are introduced to image processing and data communication system design.

**Instructor(s):** Paolo Prandoni

**Level:** MA1

**ECTS:** 6.0

**Workload in student hours:** 180.0

**Semester:** 1: jan-june

**Full course description:** Basic discrete-time signals and systems: signal classes and operations on discrete-time signals, signals as vectors in Hilbert space Fourier Analysis: properties of Fourier transforms, DFT, DTFT; FFT. Discrete-Time Systems: LTI filters, convolution and modulation; difference equations; FIR vs IIR, stability issues. Z-transform: properties and regions of convergence, applications to linear systems. Filter Design: FIR design methods, IIR design methods, filter structures. Stochastic and Adaptive Signal Processing: random processes, spectral representation, Optimal Least Squares adaptive filters. Interpolation and Sampling: the continuous-time paradigm, interpolationthe sampling theorem, aliasing. Quantization: A/D and D/A converters. Multi-rate signal processing: upsampling and downsampling, oversampling. Multi-dimensional signals and processing: introduction to Image Processing. Practical applications: digital communication system design, ADSL.

**Prerequisites:** Required courses calculus, linear algebra Recommended courses Circuits and systems, basic probability theory Important concepts to start the course vectors and vector spaces, functions and sequences, infinite series

**Link to course on platform:** https://www.coursera.org/learn/dsp, -

**Link to course in University studyplan:** http://isa.epfl.ch/imoniteur_ISAP/!GEDPUBLICREPORTS.pdf?ww_i_reportModel=1696552884&ww_i_reportModelXsl=1696552963&ww_i_itemplan=2372813318&ww_c_langue=fr

**Course registration opening date:** 01/02/2020

**Course registration deadline:** 17/02/2020

**Course withdraw date:** 04/05/2020

**Midterm:** No

**Midterm details:** -

**Exam period start:** 15/06/2020

**Exam period end:** 04/07/2019

**Exam date:** -

**Exam timing:** Synchronous (exam needs to take place at the same date and time everywhere)

**Exam start time:** -

**Exam end time:** -

**Time zone (at the time of the exam, DST):** UTC+2

**Exam registration date:** 04/05/2020

**Exam resit available:** No

**Exam resit period start:** -

**Exam resit period end:** -

**Exam resit date:** -

**Exam resit time start:** -

**Exam resit time end:** -

**Time zone (at the time of the resit of the exam, DST):** -

**Final exam type:** Written

**Final exam details:** Could be organised on Saturday. The date and place for the final exam will be announced towards the end of the semester. Online students, please find out with your local officials how the exam will be administered. The final grade for the class will be based entirely on your performance during the written final exam. There will be no midterm exam but I will hand out a "mock" midterm just before spring break that you can use as a checkpoint to see if you're up to speed with the class. The final exam is closed-book. However, you will be allowed to bring with you two A4 sheets of \emph{handwritten} notes, front and back: no photocopies please. Calculators and all other electronic devices are not allowed (yes, just like during takeoff and landing).

**Exam requirements for home university (computer, VOIP, recording materials):** proctored room, could be organised on Saturday

**Cap (maximum number of exchange students):** 10.0

**Offered to which partenrs:** -, All partners of the Alliance(s) selected above

**Link to course image:** https://drive.google.com/open?id=17KH328G9dm6LP4jd_syeMntPJqnbShsX