



# Faculté des sciences appliquées

**FSA**

## ELEC2580 DESIGN OF RF AND MICROWAVE COMMUNICATION CIRCUITS

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

**Teacher(s):** Denis Flandre, Danielle Janvier, Jean-Pierre Raskin  
**Language:** french  
**Level:** 2nd cycle course

### Aims

At the end of this course, the students will be able to

- design active circuits in RF as well as microwaves and millimeter waves
- measure the performance of these circuits

This implies the knowledge of the design and measurement constraints at frequencies where the wavelength is of the order of magnitude of the circuit dimensions.

### Content and teaching methods

#### Contents

- introduction to the architecture of integrated RF receivers
- transmission lines, RF and microwave passive devices
- linear and non-linear models of active devices
- S-parameters and noise parameters measurement
- Design and optimization of amplifiers (operational amplifier and LNA)
- Design of VCO
- Design of mixers

#### Methods

This course introduced the integrated RF receivers and derives the functionality of amplification, oscillation, mixing, frequency generation and PLL.

The first part of the course introduced and analyses the various planar transmission lines used at microwave and millimeter waves (microstrip, coplanar waveguide, finlines) as well as current passive devices. Simplified mathematical expressions are given for the design.

Various numerical methods are introduced.

The main part of the course is devoted to the design (including analysis, synthesis optimization and measurement) of active circuits : amplifiers, oscillators, mixers.

Measurement techniques of S-parameters and noise parameters are given

### Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

#### Prerequisites

ELEC2350, ELEC2360, ELEC2700 or equivalent

#### Assessment

A project consisting in the design, modeling and measurement of an active circuit is considered as the evaluation of this course.

### Other credits in programs

<b>ELEC23</b>	Troisième année du programme conduisant au grade d'ingénieur civil électricien	(5 credits)
---------------	--	-------------