



Faculté des sciences appliquées

FSA

ELEC2700 MICROWAVE

[30h+45h exercices] 6 credits

This course is taught in the 2nd semester

Teacher(s): Isabelle Huynen, Danielle Janvier
Language: french
Level: 2nd cycle course

Aims

It is a course giving a general formation about microwave methods, techniques and measurements. The originality of the microwave frequency range is that the wavelength is of the order of magnitude of the size of the devices. This optional course presents the fundamentals of microwave engineering and is proposed as the basic course in this domain for the telecommunication and electronic orientations.

After this course the students will be able to :

- calculate the parameters of various microwave transmission lines
- analyse the parameters of various passive circuits
- design basic passive devices, in waveguide and planar technology
- measure S-parameters of 2-port and 4-port microwave devices, using a scalar network analyser
- use adequate active devices in the frequency range of interest
- calculate the link budget of an earth-satellite link, taking into account the antenna, spatio-temporal characteristics of the channel and the various noise components

Content and teaching methods

Contents

- wave formalism and S-parameters
- transmission lines and resonators (planar lines, waveguides)
- passive devices (obstacles, junctions, couplers, filters, non-reciprocal circuits)
- measurement of circuit parameters : reflection, transmission, power and noise
- instrumentation : network analysers, spectrum analyser, calibration methods
- sources and active components : vacuum tubes, semiconductors (diodes, transistors)
- radiation, transmission and communication systems (link budget)

Teaching methods

The course consists of theoretical lessons, practical exercices and a project, using ADS design program of Agilent, where the students design, simulate and measure a passive planar device.

Prerequisites

Basic knowledge in transmission lines and electronics

Assessment

Written examination with the book, the project is 25% of the total

Other credits in programs

ELEC22	Deuxième année du programme conduisant au grade d'ingénieur civil électricien	(6 credits)
ELEC23	Troisième année du programme conduisant au grade d'ingénieur civil électricien	(6 credits)