

UE Microwave Circuits



Level
Baccalaureate
+5



ECTS
6 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX9ICAC

Presentation

Description

The goal of this course is to explore the theory, design and characterization techniques of the main passive circuits appearing in wireless communication systems: power dividers, matching networks, couplers, baluns, filters, ...

Only passive circuits based on distributed approach (transmission lines) will be addressed, in PCB, CMOS/BiCMOS and alternative technologies, from RF to mm-wave circuits. The circuits are based on classical transmission lines like microstrip, coplanar or SIW (Substrate Integrated Waveguide), but a large focus will be done on new transmission lines based on slow-wave concepts, including slow-wave CPW, slow-wave microstrip and slow-wave SIW.

The design of tunable passive circuits will also be discussed.

The characterization techniques will be explored in theory and in practical labs.

Content: S parameters, ABCD, Y & Z matrices. Smith chart, matching networks. Signal-flow diagram. Classical low-profile transmission lines: microstrip, coplanar (CPW & CPS). Substrate integrated waveguides (SIW). Slow-wave structures. Design of power dividers, matching networks, couplers, baluns, filters, phase shifters. Characterization and de-embedding techniques.

This teaching module will be divided into 2 parts

- **Microwave passive circuits (course) – 24 hours – 3 ECTS**

- **Lab work: Design and characterization of microwave passive circuits – 24 hours – 3 ECTS**

Course parts

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|------------------------------|------------------------------------|-----|
| UE Microwave Circuits - CMTD | Lectures (CM) & Teaching Unit (UE) | 24h |
| UE Microwave Circuits - TP | Practical work (TP) | 24h |

Period : Semester 9

Bibliography

- D. M. Pozar, "Microwave Engineering".
- Peter A. Rizzi, "Microwave Engineering: Passive Circuits".
- Robert E. Collin, "Foundations for Microwave Engineering".
- R. N. Simons, "Coplanar Waveguide Circuits, Components, and Systems".
- I Wolff, "Coplanar Microwave Integrated Circuits".
- B. Razavi "RF Microelectronics: United States Edition".

Useful info

Place

- › Grenoble
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Campus

- › Grenoble - Scientific Polygon