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# Microwaves

## Finalità

The course aims to provide the basic theoretical knowledge, analysis tools and application examples of microwave components.

## Programma

- Guided propagation and waveguides.

Modal functions, waveguide eigenvalues and eigenvectors. Mode orthogonality.

Guided mode spectrum, mode expansion and power distribution.

Modal, intra-modal, polarization and waveguide dispersion.

Mode impedance.

Rectangular and circular metallic waveguide.

Measurement tools.

Microwave transmission lines, microstrip and stripline.

Microwave circuit theory. N-port circuits and two port junction.

Impedance, admittance and scattering matrices for passive circuits.

Passive microwave devices; terminations, couplers, attenuators, filters, hybrid junctions, magic T, circulators.

Resonators ; definition, resonant field and cavity modes. Losses and Q-factor

Microwave amplifiers. Gain, stability, noise.

Microwave antennas and plane wave spectrum.

Numerical methods for electromagnetism.

## Attività d'esercitazione

Lab activity with numerical codes for the analysis of waves propagation in metallic waveguides

## Modalità d'esame

Oral test

## Propedeuticità

Propagazione Guidata, Antenne A

## Testi consigliati

Collin R.E. Foundation for Microwave Engineering, Second Edition, Mc. Graw Hill, 1992.

Stracca G.B. Teoria e Tecnica delle Microonde, CLUP – Città Studi, 1991.