

Antennas Project



Component

École Nationale
Supérieure
d'Électrotechnique
d'Électronique
d'Informatique
d'Hydraulique
et des
Télécommunications

In brief

- > **Amety's Code:** N8EE02B
- > **Open to exchange students:** Yes

Presentation

Objectives

By the end of this course, students will:

- be familiar with the different types of antennas and their radiation principles,
- be familiar with the different fundamental parameters that characterize antennas,
- know how to study a link budget between two antennas (transmission and reception) (Friis formula),
- be able to size an antenna array (linear or planar) for a given set of specifications,
- be familiar with certain antenna simulation tools and characterization methods (measurement),
- be able to analyze a scientific article.

Description

This project is a PBL (Project-Based Learning) project.

It consists of two parts (Course & BE):

A- Course

- Introduction to radiation,
- Different types of antennas,
- Fundamental parameters,
- Link budget,
- Introduction to antenna arrays,
- Simulation tools and characterization methods (measurement),
- Introduction to the analysis of scientific articles.

B- Design office

- Analysis of a scientific article:
 - Ability to reproduce the design of an antenna presented in a scientific journal (article) and understand how it works,
 - Study the performance of this antenna in terms of adaptation and radiation.
- Reproduction of a "comparison & critical review" design:
 - Ability to reuse this antenna by meeting specific specifications (different frequency band, different technology, etc.)
 - Ability to adjust design parameters in order to modify performance.
- Networking of an elementary antenna:
 - Ability to network an elementary antenna (1D linear and 2D planar) by setting the optimal inter-element distance (network mesh) for a given misalignment.
 - Parametric study: impact of inter-element distance and number of elementary antennas (1D and 2D) on radiation performance (directivity, gain, array lobes, secondary lobes SLL, power and aperture efficiency, etc.).
 - Drafting of a technical data sheet (design report)

Pre-requisites

Electromagnetism

Materials physics (dielectric materials section)

Propagation in lines

Transmission lines