

Science de Réseaux



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

In brief

> **Code:** N8EN18C

Presentation

Objectives

It is an interdisciplinary module, focusing on the science of complex networks and their applications. The content covers mathematical and computational tools for network analysis, their applications to social and dynamic networks, and their use in research on real complex systems. Students learn through the results of ongoing research in the field, and will apply their knowledge in the analysis of real network systems, the main objective of preparing them for a final project.

Description

The following topics are discussed: Network properties: (Density, size, average degree, average path length, diameter, clustering coefficient, connectivity, centrality, influence, etc.), Network models: Random graphs (Erdos-Renyi) , small worlds (Watts-Strogats), preferential attachment (Barabasi-Albert), time graphs, Network analysis: Social network analysis, dynamic network analysis, link analysis, robustness analysis, pandemic analysis (duration of infection , recovery times,...), web link analyzes (page ranking, ...), centrality measurements,..., Analysis tools: spectral analysis for complex networks, measurement tools (Gamma tool), Dissemination of content in a network (SIR model): analysis of dissemination phenomena, communities,..., Interdependent networks (degrees of correlation,...).

Pre-requisites

Graph Theory, Statistics, Data Analysis