

Telecom and IoT

ECTS credits
8 creditsSemester
Fall

Presentation

Learning objectives

Wireless telecommunications and Internet of Things (IoT) systems engineering is an expertise that allows future graduates to enter this booming economic sector, particularly with the emergence of massive connected objects and the deployment of 5G networks. They will have the necessary know-how to implement next-generation network technologies with high energy and spectral efficiency. They can bring their knowledge to bear on many emerging applications, especially those related to the future smart-cities and smart-homes. They will also be able to play the role of consultant for the implementation of new networks and on the technologies to choose to interconnect devices for IoT customers.

This module provides students with the fundamentals of telecommunications and a good understanding of systems, with a focus on applications, enabling them to acquire solid skills constituting digital transmission systems, especially wireless. In addition to the classical systems massively deployed to date, advanced communication systems that are considered as niche technologies, especially in relation to IoT applications, and the main challenges for the deployment of these systems will be addressed.

Description of the programme

Basics of digital transmissions:

Information processing for telecom systems

Transmission and reception techniques

Transmission medium (channel) and associated disturbances

Transmission protocols

Multi-user systems

Smart radio, smart antennas and MIMO systems

Energy consumption of systems/networks

Quantum transmission protocols and quantum cryptography

Transmission security

Future 6G networks and tactile Internet

Non-terrestrial networks: satellite (Starlink, Oneweb, etc.), HAP and UAV

Underwater communications

Marketing study, telecom market

Applications :

Wireless transmissions: mobile telephony (especially 4G, 4G+, 5G and 5G+ networks), local (Wi-Fi), wide area (WiMAX, LPWAN) and personal (Bluetooth, Zigbee...) networks

sensor networks, "smart grids" networks,...

Wired transmissions: ADSL, carrier current,...

Satellite communications

Optical communications by fiber, wireless optics (laser communications, Li-Fi, smart lighting...)

Industrial IoT and IoT for smart environments (smart city and smart home, e-health, factories of the future)

WebService and interface with the Cloud; Fog networking...

Bibliography

[1] Goldsmith, *Wireless Communications*, Cambridge University Press, 2005.

[2] A. Lapidoth, *A Foundation in Digital Communication*, Cambridge University Press, 2009.

[3] U. Madhow, *Fundamentals of Digital Communication*, Cambridge University Press, 2008.

[4] S. Dimitrov et al., *Principles of LED Light Communications: Towards Networked Li-Fi*, Cambridge University Press, 2015.

[5] M. Sakidu, *Optical and Wireless Communications: Next Generation Networks*, CRC Press, 2002.

Teaching team

Jean-Christophe Antona

Nicolas Bertaux

Thomas Durt,

Ali Khalighi, « industrial speakers »

Total des heures

CM	Master class	110h	60h
TP	Practical work		30h
TD	Directed work		10h
AA			10h

Useful info

Name responsible for EU

Lead Instructor

Mohammad Ali Khalighi

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