

# MASTER'S DEGREE OF ENGINEERING

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## MAJOR IN IOT & SMART CITIES

**DEGREE: National Diploma of Engineering** – internationally recognized as a **Master's Degree of Engineering**. For a complete description of this degree please refer to the relevant Campus France page:

[https://ressources.campusfrance.org/esr/diplomes/en/titre\\_ingenieur\\_en.pdf](https://ressources.campusfrance.org/esr/diplomes/en/titre_ingenieur_en.pdf)

**LENGTH:** 2 years, including 3 semesters of coursework and 1 semester of internship (industry or laboratory)

### PROGRAMME PRESENTATION

Today, IoT is the major driver of growth in the telecommunications market. Smart devices have become innovation enablers in all industrial fields (transportation, energy, surveillance, industrial logistics, agriculture, healthcare, consumer electronics).

These numerous options mean that companies developing products and services are making important strategic decisions combining their prediction of how markets will evolve and how they will meet this evolution through IoT. As a consequence, the demand of competences in this new and evolving landscape is increasing.

The Smart Cities and Urban IoT program graduates engineers with technical expertise in the IoT infrastructures (licensed and unlicensed connectivity), networking, cybersecurity and data science, as well as with a developed sense of the value chain of IoT and data, and of the opportunity and challenges that they represent.



Build the smart objects +

Collect and transmit the raw data +

Extract knowledge from the data

### KEY FEATURES OF THE PROGRAMME

- ✓ Advanced digital communication
- ✓ Network and security
- ✓ Interconnection of devices
- ✓ Data Science
- ✓ Urban IoT
- ✓ Technical Project

### PRE-REQUISITES

- A Bachelor degree or equivalent in related fields
- Proven knowledge in the following fields:
  - Introduction to computer networks (TCP/IP networks)
  - Coding (any language)
  - Signal processing
  - Introduction to digital communications (optional but strongly recommended)
  - Linux Operating System

## CAREER PERSPECTIVES



### IoT strategy, deployment and management

- ✓ IoT project manager
- ✓ Data scientist
- ✓ IoT consultant

### IoT infrastructure

- ✓ IoT developer
- ✓ Network & Telecoms architect

The explosion of connected objects has led to a growth in job offers in the sector, multiplied by 15 between 2014 and 2017. Our students from this major will have a broad spectrum of knowledge based on the global vision of an IoT network:

- Design, sensor identification
- Retrieval and processing of information
- Cloud and network security
- Transmission techniques and digital communications.

From cars connected to smart homes, smart cities offer a limitless range of applications to communicating objects, creativity will be at the heart of IoT engineers' professions

## YEAR 1

### FALL SEMESTER – OCTOBER TO JANUARY

<b>COURSES FUNDAMENTAL KNOWLEDGE*</b>	<b>VOLUME COURSES + LAB 96H</b>	<b>ECTS CREDITS</b>
<b>JAVA Programming</b>	24h	3
<b>Database</b>	24h	3
<b>UNIX</b>	24h	3
<b>Telecommunication Networks</b>	24h	3

\*compulsory courses (12 ECTS)

<b>COURSES SPECIFIC KNOWLEDGE**</b>	<b>VOLUME COURSES + LAB 96H</b>	<b>ECTS CREDITS</b>
<b>Introduction to IoT</b>	24h	3
<b>C programming</b>	24h	3
<b>Microsystems</b>	24h	3
<b>Signals and communications</b>	24h	3
<b>Introduction to Cybersecurity</b>	24h	3

<b>Web programming</b>	24h	3
<b>Software engineering</b>	24h	3

\*\* choose 4 courses (12 ECTS) from the 7 – Total: 96h

<b>COURSES SOFT SKILLS AND MODERN LANGUAGES*</b>	<b>VOLUME 90H</b>	<b>ECTS CREDITS</b>
Management of international projects	18h	2
Technical English	18h	2
French as Foreign language	54h	4

\* 3 compulsory courses (8ECTS) – Total : 90h

## SPRING SEMESTER – APRIL TO JULY

<b>COURSES NETWORKS &amp; SERVICES*</b>	<b>VOLUME COURSES + LAB 120H</b>	<b>ECTS CREDITS</b>
Network & Service administration	32h	2
Switching & Routing IPv4 and IPv6	32h	2
Cloud Architecture	24h	2
Wireless Security	20h	2
Radio propagation	12h	2

\*compulsory courses (10 ECTS) – Total : 120h

<b>COURSES DATA ACQUISITION*</b>	<b>VOLUME COURSES + LAB 114H</b>	<b>ECTS CREDITS</b>
Java for Android (Android Studio)	32h	2
Data collection (C, theory micro C, I/O practice)	28h	2
Overview of wireless Networks	20h	2
Machine learning	24h	2
OS Embedded	20h	2

\*compulsory courses (10 ECTS) – Total : 114h

<b>PROJECT*</b>	<b>VOLUME 60H</b>	<b>ECTS CREDITS</b>
Practical engineering project	60h	5

\*compulsory project (5 ECTS)

<b>COURSES SOFT SKILLS AND MODERN LANGUAGES*</b>	<b>VOLUME 48H</b>	<b>ECTS CREDITS</b>
TOEIC preparation	18h	2
French as Foreign language	30h	3

\* compulsory courses (5ECTS) – Total : 48h

## YEAR 2

### FALL SEMESTER - OCTOBER TO JANUARY

<b>COURSES NETWORK AND INTERCONNECTION OF DEVICES *</b>	<b>VOLUME COURSES + LAB 84H</b>	<b>ECTS CREDITS</b>
Mobile network architecture 3GPP	36h	3
2G to IoT	18h	3
Radio and antennas for Embedded Systems	30h	3

\*compulsory courses (9 ECTS) – Total 84h

<b>COURSES SECURITY *</b>	<b>VOLUME COURSES + LAB 50H</b>	<b>ECTS CREDITS</b>
Security basics & mini project	30h	3
Security IoT & TP	20h	3

\*compulsory courses (6 ECTS) – Total 50h

<b>COURSES IOT LABS *</b>	<b>VOLUME COURSES + LAB 56H</b>	<b>ECTS CREDITS</b>
Wireless sensor net Lab & TP SmartMesh IP	32h	3
IA applied with Smart Cities – Part 1	24h	3

\*compulsory courses (6 ECTS) – Total 56h

### JANUARY TO APRIL

<b>COURSES NETWORK AND INTERCONNECTION OF DEVICES *</b>	<b>VOLUME COURSES + LAB 88H</b>	<b>ECTS CREDITS</b>
Cellular IoT : LTE-M & NB-IoT	12h	3
LPWAN Network & Services (LoRa + Sigfox)	12h	3
Vehicular & AD-HOC net	24h	3
5G – ICT Huawei Academy	40h	3

\*compulsory courses (12 ECTS) – Total 88h

<b>COURSES IOT LABS **</b>	<b>VOLUME COURSES + LAB 76H</b>	<b>ECTS CREDITS</b>
Wireless sensor net Lab	20h	3
MangOH Lab	32h	3
IA applied with Smart Cities -Part 2 with project	24h	3

\*compulsory courses (9 ECTS) – Total 76h

<b>PROJECT*</b>	<b>VOLUME 120H</b>	<b>ECTS CREDITS</b>
Practical final engineering project	120h	8

\*compulsory project (8 ECTS)

<b>COURSES</b> <b><i>SOFT SKILLS AND MODERN LANGUAGES*</i></b>	<b>VOLUME</b> <b>48H</b>	<b>ECTS CREDITS</b>
Professional English for Job Seekers	18h	2
French as Foreign language	30h	3

\* compulsory courses (5ECTS) – Total : 48h

## **SPRING SEMESTER – APRIL TO SEPTEMBER**

<b>INTERSHIP*</b> <b>INDUSTRY OR LAB INTERNSHIP</b>	<b>VOLUME</b> <b>800H</b>	<b>ECTS CREDITS</b>
Industry or Lab internship	800h	30

\*compulsory intership (30 ECTS)