# MASTER'S DEGREE OF ENGINEERING

## –

## 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 refere to the relevant Campus France page:
https://ressources.campusfrance.org/esr/diplomes/en/titre_ingenieur_en.pdf

### 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

*International students can cross-select courses from each major. Moreover, undergraduate and graduate students can choose courses from this master's degree.*

# YEAR 1
## FALL SEMESTER – OCTOBER TO JANUARY

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

*compulsory courses (12 ECTS)

| COURSES<br>SPECIFIC KNOWLEDGE** | VOLUME<br>COURSES + LAB<br>96H | ECTS CREDITS |
|---|---|---|
| Introduction to IoT | 24h | 3 |
| C programming | 24h | 3 |
| Microsystems | 24h | 3 |
| Signals and communications | 24h | 3 |
| Introduction to Cybersecurity | 24h | 3 |
| Web programming | 24h | 3 |
| Software engineering | 24h | 3 |

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

| COURSES<br>SOFT SKILLS AND MODERN LANGUAGES* | VOLUME<br>90H | ECTS CREDITS |
|---|---|---|
| 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

| COURSES<br>NETWORKS & SERVICES* | VOLUME<br>COURSES + LAB<br>120H | ECTS CREDITS |
|---|---|---|
| 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

| COURSES<br>DATA ACQUISITION* | VOLUME<br>COURSES + LAB<br>114H | ECTS CREDITS |
|---|---|---|
| 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

| PROJECT* | VOLUME 60H | ECTS CREDITS |
|---|---|---|
| Practical engineering project | 60h | 5 |

*compulsory project (5 ECTS)

| COURSES SOFT SKILLS AND MODERN LANGUAGES* | VOLUME 48H | ECTS CREDITS |
|---|---|---|
| TOEIC preparation | 18h | 2 |
| French as Foreign language | 30h | 3 |

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

# YEAR 2
## FALL SEMESTER – OCTOBER TO JANUARY

| COURSES NETWORK AND INTERCONNECTION OF DEVICES * | VOLUME COURSES + LAB 84H | ECTS CREDITS |
|---|---|---|
| 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

| COURSES SECURITY * | VOLUME COURSES + LAB 50H | ECTS CREDITS |
|---|---|---|
| Security basics & mini project | 30h | 3 |
| Security IoT & TP | 20h | 3 |

*compulsory courses (6 ECTS) – Total 50h

| COURSES IOT LABS * | VOLUME COURSES + LAB 56H | ECTS CREDITS |
|---|---|---|
| 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

| COURSES NETWORK AND INTERCONNECTION OF DEVICES * | VOLUME COURSES + LAB 88H | ECTS CREDITS |
|---|---|---|
| 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

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

*compulsory courses (9 ECTS) – Total 76h

| PROJECT\* | VOLUME<br>120H | ECTS |
|---|---|---|
| Practical final engineering project | 120h | |

*compulsory project (8 ECTS)

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

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

## SPRING SEMESTER – APRIL TO SEPTEMBER

| INTERSHIP\*<br>INDUSTRY OR LAB INTERNSHIP | VOLUME<br>800H | ECTS CREDITS |
|---|---|---|
| Industry or Lab internship | 800h | 30 |

*compulsory intership (30 ECTS)