ARCHITECTURE AND ENGINEERING FOR THE INTERNET OF THINGS
MASTER OF SCIENCE

ACCREDITATION

Internationally recognized Master's Degree in Information technologies (IT) accredited by the French Ministry of Higher Education and Research.
National Accreditation Reference: 1702068Z
Co-accredited with the University of Southern Brittany (Université de Bretagne Sud, UBS).

KEY WORDS

Information Technologies / Internet of Things / Data Science / Computer Networking / Convergent Networks / Wireless Networks / Mobile Networks / Internet / Network Services / Network Solution Design / Network Planning and Design

SCHOOL PROPOSING THE MASTER

IMT Atlantique, a «grande école» which is part of the IMT (Institut Mines-Télécom), a leading French higher education and research institution in engineering, with 12,500 students.

LOCATION

Classes are given in Brest (1st year) and in Rennes (2nd year) which are located in Brittany, one of the most visited areas in France due to its breathtaking landscapes and seascapes as well as its numerous historical treasures. Both campuses are well located and include halls of residence: in Brest, in the centre of the Science Park overlooking the entrance to the Bay and in Rennes, in the centre of the Research Park.

STRONG POINTS OF THE PROGRAM

Besides being a flagship of European institutes of higher education, IMT Atlantique is affiliated with many networks of alliances in France and abroad, as well as a pole for high- level research activities. Strong links with industry have made it possible to reach excellence in pedagogical methods, project-based teaching and corporate research.
Almost half of the students come from outside France, with more than 50 nationalities on our campuses. This fact reflects a very high intercultural dimension and results in an interesting, enjoyable, multicultural everyday life experience.
Furthermore, the teaching staff consists of internationally renowned specialists in IoT, IP network technologies, mobile networks and services and network security.

INDUSTRIAL PARTNERS (COURSES AND INTERNSHIPS)

Aéroport de Paris, Air France, Alcatel- Lucent, Astellia, BNP PariBas, Bouygues Télécom, Free Mobile, Mitsubishi Electric ITCE, Niji, Orange Labs / France Telecom R&D, Qualcomm, Société Générale, SFR, Technicolor, Thalès...

LANGUAGE OF TEACHING

The first semester classes are taught in English. Over this period, students acquire sufficient skills in the French language to be able to follow the second semester lectures together with native speakers. Progressive immersion in the French language and culture, an educational challenge, is one of the special features of the curriculum.
3rd semester lectures can be taught in English on demand.

ENVIRONMENT

Internet of Things (IoT) is the next revolution for the Internet. After the convergence with telephony, media distribution, the goal with IoT is to connect autonomous vehicle, manage process in industry 4.0, pilot a city to reduce pollution or monitor elderly people. There is a vast area of applications.

Nevertheless, IoT is a big technical and business challenge, which implies an entire network protocol redesign to integrate constrained objects and limited radio connectivity. Security must be revisited to protect vital processes managed by IoT. Energy consumption must be taken into account to guaranty several years autonomy on batteries. Protocols must be also reshaped to reduce their footprint and therefore equipment cost. Last but not least, IoT must find its place in the value chain and the integration with current processes must be carefully defined.

All these challenges are currently discussed by the industry. As a major actor in standardization, in security with the cyber security chair and a pioneer in Fab Labs, IMT Atlantique covers all the main skills to enlighten the IoT revolution.

COURSE AIMS

This MSc program is aimed at future experts for the design and engineering of networks with a wide field of applications and a focus on IoT.
The class requires a good level in programming in different languages (C++, python, javascript) to design IoT devices and connect them to specifically designed networks (Sigfox, LoRAWAN, 5G,…). This helps to understand the constrained nature of IoT devices. This course allows also to understand how measurements can be transformed into valuable information than can be exploited by applications or cloud computing.
This Masters program also offers a gateway to PhD studies.

PROGRAM

This is a full-time, two-year course divided into four semesters:
First semester (in Brest)
> Networking fundamentals
> Introduction to data science
> Basics of computer science
> Mathematics & signal processing
> Bibliographical study
> Intercultural workshops
> Intensive French language courses (6 hours per week)
Second semester (in Brest)
> Networks: Architectures, protocols, IP networks, mobile networks, IoT
> Computer science: software engineering and object-oriented programming, databases and information systems
> An engineering project in working groups of 5 or 6, focused on acquiring project management experience and applying knowledge acquired in coursework
> French language (3 hours per week)
Third semester (in Rennes)
> Cloud computing and big data
> Software-defined networks
> IPv6 for IoT
> Intelligent network and services
> IoT security
> Services for communication networks
> New network architectures
> Networking research seminar
> Architecture, access and interfaces for cellular networks
> Project: During this semester, students also work on a short project. This project, which can be either done individually or in pairs, may take different forms: software development; a bibliographical study of a research subject; participation in

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the design, setup or assessment of research testbeds, etc.... For this project, students will work either with an industrial partner or with a research team from the Networks, Security & Multimedia department at IMT Atlantique

> French language courses (3 hours per week)

Fourth semester

This semester is spent carrying out a development or research project in an industrial or academic laboratory in France or abroad.

Upon completion of the four semesters, students defend their Master Thesis.

ADMISSION REQUIREMENTS

The entry requirements include a first-class Bachelor's degree or a four-year degree in one of the academic topics offered by the Master's course. Candidates have to show an outstanding academic record for their application to be considered.

A solid background in mathematics is a necessary pre-requisite, as well as sound knowledge of computer science. Prior experience with the basics of computer networking and/or telecommunications, though recommended, is not mandatory.

LANGUAGE REQUIREMENTS

English

When applying, students must provide proof of proficiency in the English language. This could include:

> having English as mother tongue
> work/studies in an English-speaking country
> acquisition of an official English language qualification such as:
  – TOEFL: 550/677 (Paper-based) or 79/120 (Internet-based)
  – IELTS: 6/9
  – TOEIC: 750/990
  – Cambridge: CAE (Certificate of Advanced English)

French

Knowledge of French is not mandatory before arrival in France. In addition to French language courses during the academic year, a 3-week intensive French language course is organized by IMT Atlantique in August. This course is provided for all MSc students at no extra cost (except living expenses, insurance and social activities).

Groups range from beginner to intermediate level.

APPLYING

Apply at

http://www.imt-atlantique.fr/fr/formation/masters/masters-science

COMPETENCES ACQUIRED

Thanks to IMT Atlantiques expertise in postgraduate education and research, high-level competencies are acquired not only in technical/scientific fields but also in team working, written and oral communication, innovation and project management. Last but not least, French language skills are also one of the new competencies beneficial for working in France and other French-speaking countries, or for French companies abroad.

TYPICAL JOBS

> Network solution designer
> Network planner and designer
> Network architect
> Network project leader
> Network integration leader
> R&D engineer
> Consulting expert
> Researcher and Academic

COST

Tuition fees for the full 2-year program:
€10,200
€5,200 (Europe and Erasmus zone)
Possible partial fee waivers

SCHOLARSHIPS

Scholarships are available depending on academic record and country of origin (companies, governments, embassies, etc.). It should be mentioned that internships are paid and cover living expenses during the last semester.

DURATION

2 years (starting in mid-August)

LODGING

Living expenses are quite low in Brittany compared to other locations in France, Europe or United States. The total amount does not exceed €6,000 per year (on-campus food and accommodation).

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