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# International Master (Initial training) - MR1601C Computer Networks and IoT Systems

## Introduction

- Language of instruction: English.
- Mode of learning: daytime, full time, on-site and remote classes.
- Length: M1: 1 year, M2: 1 year, M1+M2: 2 years.
- Official title appearing in the degree: "Master Sciences, technologies, santé - mention Informatique", meaning Master of Science, Technologies and Health - track in Computer Science.
- French Ministry habilitation: Arrêté du 28 janvier 2019, Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation.
- Master website: [master.roc.cnam.fr](http://master.roc.cnam.fr)

## Program's presentation

The Master program takes place at Conservatoire national des arts et métiers (Cnam), Paris downtown, France, in the heart of the Ville Lumière (the City of Light), Marais district, in a vibrant multi-cultural international and stimulating environment.

The Master program covers:

- basics about network architectures and operating systems;
- advanced technologies related to the design IoT computing systems, protocols and applications;
- novel network architectures emerging with network virtualization (NFV), edge computing (MEC) and softwarization (SDN, SD-x);
- modeling and performance evaluation of networks and computing systems, including 5G and beyond 5G systems;
- integration of artificial intelligence and novel decision-making frameworks for the operations and automation of communication networks and IoT Systems.

The Program's faculty body includes world-class academics and industry experts. They participate actively in various areas such as: international, European and national collaborative projects, industrial research projects (H2020, ANR), standardization and open-source bodies (ONF, IETF, ETSI) etc.

Lecturers are also active researchers and engineers, who contribute significantly with standards, open source projects, scientific articles and publications to the contents of the Master program.

## Objectives and Skills Learned

The Master program is meant for students willing to become expert of digital infrastructure technologies, going from network and Internet/cloud infrastructures to edge computing and IoT systems and applications.

Students attending the Computer Networks and IoT Systems Master program will learn and experiment current and novel technologies underpinning the Internet infrastructure, related to Network Virtualization, Internet-of-Things (IoT) protocols and architectures, IoT device design, Artificial Intelligence and Machine Learning integration in network and embedded systems, Software-Defined-Networking, Cloud Networking, 5G and beyond-5G architectures – a set of novel technologies driving the digital society evolution.

## Admission requirements

International, extra-European and European students willing to pursue a Master degree program in English, and possessing a Bachelor-level degree in one of following fields: Computer Science, Electronics, Computer Engineering, Electrical Engineering, Software Engineering, ICT Engineering. Admission is also possible at the M2 (2nd year level) if you can justify 4 years of university study in one of the fields mentioned above with equivalent M1 (1st year) courses.

Application:

- 2-page curriculum vitae (CV);
- copy of Bachelor degree, and Master degree (if any);
- transcripts of grades of all previous degrees;
- signed motivation letter indicating if asking admission at the M1 or M2 level, and asking for scholarship;
- English certificate equivalent to B1 for M1 (1<sup>st</sup> year), B2 for M2 (2<sup>nd</sup> year), according to the CEFRL (Common European Framework of Reference for Languages);
- coordinates (email, telephone, address) of two reference professors.

Students coming from outside the European Union have to apply via Campus France :

<https://www.campusfrance.org>

Online application is possible via the «Études en France» platform :

<https://pastel.diplomatie.gouv.fr/etudesenfrance>

More details on the application procedure:

[master.roc.cnam.fr](http://master.roc.cnam.fr)

**S**cholarships and travel grants  
available based on excellence criteria.

## International Master Computer Networks and IoT Systems

| Code                      | Courses                                                                           | Credits |
|---------------------------|-----------------------------------------------------------------------------------|---------|
| <b>Master 1</b>           |                                                                                   |         |
| USEEJ6                    | Telecommunication Networks                                                        | 6       |
| USEEJ7                    | Networks - Complements and Applications                                           | 6       |
| USEEJ8                    | Wireless Mobile Networks                                                          | 6       |
| USEEK7                    | Network Security                                                                  | 6       |
| USEEN1                    | Computer Systems Modeling and Verification                                        | 6       |
| USEEN2                    | Operating Systems and Computer Architecture                                       | 6       |
| USEEN3                    | Operations Research                                                               | 4       |
| USRS2H                    | Refresh in C & Bash Programming                                                   | 3       |
| USMC84                    | Scientific Communication I - Disseminating                                        | 2       |
| USEEK3                    | Contemporary Economic Issues I                                                    | 3       |
| <b>12 ECTS to choose:</b> |                                                                                   |         |
| USEEJ9                    | French as foreign language                                                        | 6       |
| USEEK1                    | English                                                                           | 6       |
| USEES5                    | Sustainable IoT Architectures                                                     | 3       |
| USEES6                    | Next Generation IEEE 802.11 standards                                             | 3       |
| USEES7                    | Data Management and Digital Transformation in Industrial ProcessAutomation        | 3       |
| USEES8                    | Big Data Technologies for Connected Industries                                    | 3       |
| USEES9                    | Robot Predictive Maintenance                                                      | 3       |
| USEET1                    | Integration of Virtual and Augmented Reality Technologies in Connected Industries | 3       |
| <b>Master 2</b>           |                                                                                   |         |
| USEEK8                    | Advanced Projects in Networks and IoT Systems                                     | 6       |
| USEEK9                    | Internet of things                                                                | 2       |
| USEEN4                    | Network Virtualization and Automation                                             | 6       |
| USEEN5                    | Embedded Systems: Applications and Cybersecurity                                  | 6       |
| USEEN6                    | Artificial Intelligence and Machine Learning for Networks and IoT                 | 6       |
| USMC85                    | Scientific Communication II - Dialoguing                                          | 2       |
| USRS78                    | Advanced python programming                                                       | 3       |
| USMC86                    | Contemporary Economic issues II                                                   | 2       |
| <b>6 ECTS to choose:</b>  |                                                                                   |         |
| USEEJ9                    | French as foreign language                                                        | 6       |
| USEEU6                    | Applied Artificial Intelligence                                                   | 3       |
| USEEU7                    | WiFi and 5G Convergence in 6G                                                     | 3       |
| USEEU8                    | Smart Industry 4.0 Systems                                                        | 3       |
| USEEU9                    | Green AI Computing for Connected Industries                                       | 3       |
| USEEV1                    | Communications for Precision Agriculture and Farming                              | 3       |
| USEEV2                    | Applications of AI and Cyber-threat Management                                    | 3       |
| USEEV5                    | FPGA Platforms: Programmable Embedded Systems                                     | 3       |
| UAEE2B                    | Internship                                                                        | 21      |

### Calendar

- Registration: till end of June
- Visa: till end of July
- Arrival: till end of September
- Start of classes: October
- End of classes: June

### Fees

- For extra-European students: 3 879 € per year
- For European students : 250 € per year

Your employer or a sponsoring company can cover the registration fees.

Scholarships covering tuition fees and/or living expenses can be attributed to outstanding students.

### Courses (examples)

- Internet routing architecture
- Internet of Things (IoT)
- IoT device system design
- Artificial Intelligence and Machine Learning
- Cybersecurity architectures
- Network security
- Wireless and mobile networks
- Network Functions Virtualization
- Network Automation
- Software Defined Networking
- 5G and 6G architectures

### Career opportunities

- Computer Scientist
- Network engineer
- IoT engineer
- Computer Systems Engineer
- Internet Engineer
- Network Expert
- Embedded Systems Engineer
- Expert Consultant in Computer Networks and Systems

### Corporate partners/employers (examples)

- Orange
- SFR
- OVH
- Nokia
- Thales
- Huawei Technologies France
- Ericsson
- SQUAD
- Gandi

Depuis décembre 2021, le Cnam est certifié Qualiopi pour l'ensemble des entités de formation de l'établissement public, et pour les quatre types d'actions couvertes par cette certification :

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La certification qualité a été délivrée  
au titre des catégories d'actions suivantes :  
**ACTIONS DE FORMATION**  
**BILANS DE COMPETENCES**  
**ACTIONS DE VALIDATION DES ACQUIS DE L'EXPERIENCE**  
**ACTIONS DE FORMATION PAR APPRENTISSAGE**



Helping students with  
disability: :

**handi.cnam.fr**

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