

# MASTER'S DEGREE OF ENGINEERING

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## MAJOR IN CYBERSECURITY

**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)

### PROGRAMME PRESENTATION

The program of Cybersecurity aims at teaching students knowledge and solid skills in advanced specification, design, development, implementation and maintenance of secure systems. In particular, students should understand and apply methods and techniques to investigate vulnerabilities of a given system or a solution such as scanning techniques and penetration testing, from theoretical and practical point of view.

In addition, we focus on systems security management and audit. A didactic methodology is applied, based on classes,

specialized seminars, conferences, case studies, practical sessions in computer labs, tutorials, projects, and self-learning. Students should participate to some international challenge around at least one of the cyber security domains (Systems, Networks, Telecommunication, Software, Web, and Hardware).

### CAREER PERSPECTIVES



## **TARGET SKILLS**

- Know the relevant technical parts of legal regulations in cyber security and their implications in the design of systems and security tools.
- Understand and master the basic security services: authentication, authorization, privacy and access control, etc.
- Analyze and detect anomalies and attack signatures in information systems and the web
- Applying vulnerability exploitation to gain unauthorized access
- Create and refine concise and comprehensive documents, plans and projects in the scope of cybersecurity
- Know the trends in cyber-attack techniques
- Know and apply the cryptographic and steganographic mechanisms required to protect data stored in a system or data transiting a network
- Design and evaluate security architectures for applications, systems, websites and networks.
- Analyze the risks of introducing personal devices in a corporate professional environment. Know and apply the measures to control the risks

## **KEY FEATURES**

- Network & operating systems security
- Web & DB hacking
- Hardware & software vulnerabilities
- Cryptography
- Forensics & Reverse engineering
- Challenges & CTF

## **LEARNING ACTIVITIES AND METHODOLOGY**

- Lectures and Practical session in the lab
- Individual and group work with projects
- Seminars, conferences, and challenges

*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

<b>COURSES FUNDAMENTAL KNOWLEDGE*</b>	<b>VOLUME COURSES + LAB 96H</b>	<b>ECTS CREDITS</b>
OOP Language	24h	3
Database	24h	3
Introduction to Linux	24h	3
Computer Networks	24h	3

\*compulsory courses (12 ECTS)

<b>COURSES SPECIFIC KNOWLEDGE*</b>	<b>VOLUME COURSES + LAB 96H</b>	<b>ECTS CREDITS</b>
C programming	24h	3
Microsystems	24h	3
Signals and communications	24h	3
Web programming	24h	3
Software engineering	24h	3

\*Compulsory courses (15 ECTS)

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

\* Compulsory courses (8ECTS) = Total : 90h

## SPRING SEMESTER – APRIL TO JULY

<b>COURSES NETWORKS &amp; SERVICES*</b>	<b>VOLUME COURSES + LAB 112H</b>	<b>ECTS CREDITS</b>
Network & Service administration	32h	3
Switching & Routing IPv4 and IPv6	32h	3
Python for security	20h	2
WLAN	40h	3

\*compulsory courses (10 ECTS) – Total : 104h

<b>COURSES IT SECURITY**</b>	<b>VOLUME COURSES + LAB</b>	<b>ECTS CREDITS</b>
Web hacking	16 h	2
Secure Programming for Application Development	24 h	2
Risk Analysis - part1 (group project work)	16 h	2
Windows security & CTF	24 h	2
Cryptographic Algorithms	28h	2

\*Compulsory courses (10 ECTS)

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

<b>COURSES SOFT SKILLS AND MODERN LANGUAGES</b>	<b>VOLUME 84H</b>	<b>ECTS CREDITS</b>
<b>TOEIC preparation</b> ( <i>for degree-seeking students only</i> )	18h	2
<b>French as Foreign language*</b>	20h : exchange students 48h : Degree-seeking students	3

\* compulsory course (3 ECTS)

## YEAR 2

### FALL SEMESTER – OCTOBER TO MARCH

<b>COURSES ADVANCED NETWORKING &amp; IT**</b>	<b>VOLUME COURSES + LAB</b>	<b>ECTS CREDITS</b>
Wireless Security	20h	2
Artificial intelligence	24h	2
Network programming & security	20h	2
Transport and application	12h	2
Secure autonomous vehicles	12h	1
Blockchain and transactions security	20h	2

\*\* choose 3 courses from the 6 (11 ECTS)

<b>COURSES CYBER DEFENSE**</b>	<b>VOLUME COURSES + LAB</b>	<b>ECTS CREDITS</b>
Hardware Security	24h	2
Cloud SecDevOps	24h	1
Risk Analysis – part 2	12h	1
Identity Management	16h	2
Intrusion Detection and Prevention systems	36h	2
Managed Detection and Reaction	16h	1

\*\* choose 4 courses from the 6 (5 to 7 ECTS)

<b>COURSES CYBER ATTACK**</b>	<b>VOLUME COURSES + LAB</b>	<b>ECTS CREDITS</b>
Active Directory security audit	30h	2
Reverse Engineering	16h	2
Secure programming for embedded systems - part2	20h	2
Windows security, threats and exploitation	36h	3
Digital Forensics	16h	2
Challenge & CTF (Capture The Flag)	24	2

\*\* choose 3 courses from the 6 (6 to 7 ECTS)

<b>PROJECT*</b>	<b>VOLUME 60H</b>	<b>ECTS CREDITS</b>
Practical final engineering project 120h		8

\*compulsory project (8 ECTS) - 2hrs in Lab + 4h minimum of personal work for 20 weeks

<b>COURSES SOFT SKILLS AND MODERN LANGUAGES*</b>	<b>VOLUME 84H</b>	<b>ECTS CREDITS</b>
Professional English for Job Seekers	18h	2
French as Foreign language	30h	3

\* compulsory courses (5ECTS) – Total : 84h

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

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

\*compulsory intership (30 ECTS)