

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

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

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



- Cybersecurity consultant (analysis of the risks incurred, advice of non-vulnerabilities and adapted solutions)
- Engineer in cybersecurity (analysis, intrusion tests, list of faults, advice on defense protocols)
- IS Security Officer (defines IS security policy and ensures implementation)
- Situation Analyst (informs government authorities about the status of the threat and the situation of cyber defense operations)
- Investigative Analyst (analyzes the technical elements of a computer attack, in order to determine the understanding of the procedure to allow to remedy it)

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 comprehensively documents, plans and projects in the scope of cyber security.
- Know the trends in the 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 Web sites 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

PRE-REQUISITES TO JOIN THIS PROGRAM

- A Bachelor-degree or equivalent in related fields
- Proven knowledge in the following fields:
 - Introduction to computer networks (TCP/IP networks)
 - Programming language (structural and objet oriented programming)
 - Introduction to digital communications (optional but strongly recommended)
 - Linux Operating System

YEAR 1

FALL SEMESTER – OCTOBER TO JANUARY

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

*compulsory courses (12 ECTS)

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

*Compulsory courses (15 ECTS)

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

* Compulsory courses (8ECTS) – Total : 90h

SPRING SEMESTER – APRIL TO JULY

COURSES NETWORKS & SERVICES*	VOLUME COURSES + LAB 112H	ECTS CREDITS
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

COURSES IT SECURITY**	VOLUME COURSES + LAB	ECTS CREDITS
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)

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

*compulsory project (5 ECTS)

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

* compulsory course (3 ECTS)

YEAR 2

FALL SEMESTER – OCTOBER TO MARCH

COURSES ADVANCED NETWORKING & IT**	VOLUME COURSES + LAB	ECTS CREDITS
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)

COURSES CYBER DEFENSE**	VOLUME COURSES + LAB	ECTS CREDITS
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)

COURSES CYBER ATTACK**	VOLUME COURSES + LAB	ECTS CREDITS
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)

PROJECT*	VOLUME 60H	ECTS CREDITS
Practical final engineering project	120h	8

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

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

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

SPRING SEMESTER – APRIL TO SEPTEMBER

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

*compulsory intership (30 ECTS)