

Study Plan

I Year Teachings (63 CFU)	CFU	SSD
Architecture, Model and Analysis of Cyber Physical Systems	12	INF/01
Penetration testing	9	INF/01
Resiliency, real time and certification	6	INF/01
Advanced Programming Techniques	6	INF/01
Additional courses	30	

II Year Teachings (57 CFU)	CFU	SSD
Security Engineering	9	INF/01
Secure Wireless and Mobile Networks	9	ING-INF/03
Supplementary activities	3	
Thesis work development	24	
Final exam	3	
Additional Courses	12	

The additional courses shall be selected as follows:

- 18 CFU from courses in LIST A,
- 6 CFU from courses in LIST B,
- 6 CFU from courses in LIST C,
- 12 CFU from LIST A, B or C, or any other course from the University of Florence, as long as these are compatible with the curriculum. These CFU may also include courses for Bachelor's degrees.

LIST A	CFU	SSD
Software Dependability	6	ING-INF/05
Algorithms and Programming for Massive Data	6	INF/01
Architectures and Methods for Software Engineering	6	ING-INF/05
Computer Forensics	6	INF/01
Computer Science Education	6	INF/01
Cyber Security and ICT policies	6	INF/01

LIST B	CFU	SSD
Multivariate Analysis and Statistical Learning	6	SECS-S/01
Statistical Inference	6	SECS-S/01

LIST C	CFU	SSD
Advanced Numerical Analysis	6	MAT/08
Elements of Numerical Calculus	6	MAT/08
Approximation Methods	6	MAT/08
Stochastic Processes	6	MAT/08

Where we are

DISIA - Dipartimento di Statistica, Informatica, Applicazioni *Giuseppe Parenti*, viale Morgagni 59, 50134 Firenze

DIMAI - Dipartimento di Matematica e Informatica *Ulisse Dini*, viale Morgagni 67/A, 50134 Firenze

Plesso Didattico Morgagni, viale Morgagni 44-48, 50134 Firenze

Contacts

Chair of the M.Sc. Degree: Prof. Rosario Pugliese

e-mail: pres-cdl.informatica@unifi.it

Web site of the Curriculum:

<<http://www.informaticamagistrale.unifi.it/vp-153-curriculum-cyber-physical-systems.html>>

Contact person of the Curriculum: Prof. Andrea Bondavalli

e-mail: andrea.bondavalli@unifi.it



UNIVERSITÀ
DEGLI STUDI
FIRENZE

M.Sc. Degree in Computer Science

(class LM -18)

Curriculum (in English)

Resilient and Secure Cyber Physical Systems

Academic Year 2022-23





Why dealing with CPS?

Computer systems control an increasing number of devices with which we interact daily.

A Cyber-Physical System (CPS) is a system in which computational elements interact closely with physical entities, thus controlling individual, organizational or mechanical processes through the use of information and communication technologies (computers, software and networks).

Realizing cyber-physical systems is challenging and requires multidisciplinary knowledge ranging from distributed systems to sensor networks, from software engineering to artificial intelligence.

In addition, to enhance the resilience and security of cyber-physical systems, verification and certification methodologies and tools are required to ensure system survival in case of random anomalies, deliberate attacks, and unexpected critical events.

U.S.A. Presidential Policy Directive 21 identifies critical infrastructure as “interdependent functions and systems in both the physical space and cyberspace” and aims to strengthen security and resilience “against both the physical and cyber attacks”.

Learning Objectives

To provide solid computing and engineering knowledge and skills for the definition, design, verification and certification of complex systems that characterize many emerging areas such as the Internet of Things, Smart Factories and Critical Infrastructures.

Interdisciplinary training in multiple areas:

- Design and implementation of distributed and real-time cyber-physical systems.
- Designing secure systems.
- Paradigms and methodologies for the development of distributed and CPS-oriented applications.
- Design, validation and certification of resilient systems.
- Advanced programming and software development techniques based on “Build Automation” and “Test-driven Development” methodologies.
- Elements of numerical analysis and statistics to handle the large amount of generated data, obtain system information, and support decisions.

Admission Requirements

To access the Master’s Degree in Computer Science (class LM-18), you need to:

- Have a suitable bachelor’s degree (e.g., in Informatics or Computer Engineering);
- Meet the minimum curriculum requirements (have passed courses equivalent to at least 24 CFUs in INF/01 or ING/INF-05 and 24 CFUs in MAT/01-09, FIS/01-08 or SECS/01-06 sectors);
- Have a certified English B2 level, be an English native speaker, or have completed a bachelor’s taught in English.



Career Opportunities

The master’s graduate will have the skills requested by companies in design, development, validation and certification of critical infrastructures, system of systems, complex systems, and IoTs. Some examples of professional profiles are:

- Project manager and software developer,
- Analyst/designer of cyber-physical systems,
- Developer of cyber-physical systems.

Teaching in English aims to train students with international profiles, which ensures greater competitiveness in the job market both in Italy and abroad. The master’s graduate training also targets advanced scientific and technological research and teaching activities.

The master’s graduate in Computer Science can enrol in the Italian Information Engineers’ Registry and access PhDs in Computer Science.