

Study plan

academic year 2019|2020

1 st YEAR (63 CFU)			
Sem.	Courses	CFU	SSD
I	Distributed programming for IoT	6	INF/01
	Distributed real time Cyber Physical Systems	9	INF/01
	Quantitative Analysis of Systems	9	INF/01
II	Advanced techniques and tools for software development	9	INF/01
Additional courses		30	

2 nd YEAR (57 CFU)			
Sem.	Courses	CFU	SSD
I	Security Engineering	9	INF/01
	Secure Wireless and Mobile Networks	6	ING-INF/03
II	Supplementary activities	3	
	Thesis work development	24	
	Final exam	3	
Additional courses		12	

LIST A of additional courses			
Sem.	Courses	CFU	SSD
I	Quality and certification	6	INF/01
	Penetration Testing	6	INF/01
II	Advanced Topics in Programming Languages	6	INF/01
	Algorithms and Programming for Massive Data	6	INF/01
	Architectures and Methods for Software Engineering	6	ING-INF/05
	Computer Forensics	6	INF/01
	Software Dependability	6	ING-INF/05

LIST B of additional courses			
Sem.	Courses	CFU	SSD
I	Multivariate Analysis and Statistical Learning	6	SECS-S/01
II	Statistics	6	SECS-S/01

LIST C of additional courses			
Sem.	Courses	CFU	SSD
I	Advanced Numerical Analysis	6	MAT/08
	Elements of Numerical Calculus	6	MAT/08
	Stochastic Processes	6	MAT/05
II	Approximation Methods	6	MAT/08



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Contacts

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M.Sc. Degree
in Computer Science

Web Page of the Curriculum:
[http://www.informaticamagistrale.unifi.it/
vp-143-curriculum-cyber-physical-systems.html](http://www.informaticamagistrale.unifi.it/vp-143-curriculum-cyber-physical-systems.html)

Curriculum (in English)
**Resilient & Secure
Cyber Physical Systems**
(class LM-18)

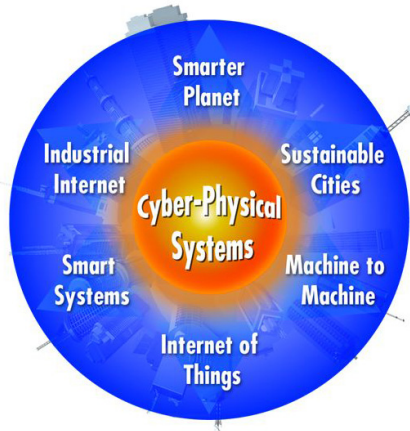
Where we are

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

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

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





Why dealing with CPS?

An increasing number of devices with which we interact on a daily basis are controlled by computer systems.

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 so to ensure system survival in case of random anomalies, deliberate attacks, and in general 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.

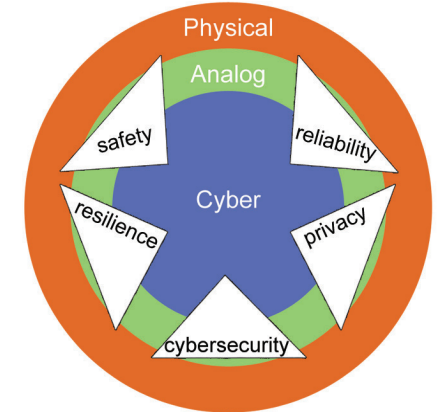
Interdisciplinary training in multiple areas:

- 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 methodologies for “Build Automation” and “Test-driven Development”.
- Elements of numerical analysis and statistics to handle the large amount of generated data, obtain

Admission Requirements

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

- Have acquired 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);
- Possess an adequate entry preparation.



Career Opportunities

The Resilient and Secure Cyber Physical Systems Curriculum is intended to provide the knowledge, formal tools and practical skills required in the aforementioned disciplines. The master's graduate will have the skills requested by companies in the field of 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 is aimed at training students with international profiles, which ensure greater competitiveness in the job market both in Italy and abroad.

The master's graduate training is also targeted at advanced scientific and technological research, and in teaching activities.

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