

# Cyber-Physical Social Systems

Master of Science

[www.mines-stetienne.fr](http://www.mines-stetienne.fr)



**INSPIRING  
INNOVATION**  
SINCE 1816

**AMasterofScience**(NationalMasters'Degree)  
Accredited by the French Ministry of Higher  
Education and Research  
at the *École Nationale Supérieure des Mines  
de Saint-Étienne*, France  
Cohabited with *University Jean Monnet /  
University of Lyon*

 **Taught in English**



## A new opportunity for international students

- Taught in English
- A one year Programme
- Diploma of Master of science
- A key step for PhD studies

**CPS<sup>2</sup> trains high level computer scientists to understand and design cyber-physical and social systems to support the increasing interconnection of physical, social and digital dimensions that transform our societies. Industry 4.0, smart cities, intelligent transport systems are some examples of such CPS Systems.**

# Course structure

Each module aims at presenting current models and technologies used in industry as well as the ones currently developed and discussed in the scientific field.

## Trust & Privacy (3 ECTS - 15h)

Access control models and technologies.  
Trust management and negotiation.  
Privacy management models and approaches

## Web Services (3 ECTS - 25h)

Design and development of Web services

## Cloud Computing (3 ECTS - 20h)

Technical & economic challenges of cloud computing architectures. Models and current technologies to design and develop Cloud services, Cloud services hosting platform and Cloud clients.

## Distributed and Mobile Computing (3 ECTS - 25h)

Models and technologies for development of Client-server architectures, J2E application, mobile applications (Android, IOS)

## Internet of Things (5 ECTS - 40h)

Concepts, models and technologies to develop Intelligent Ambient systems (e.g. machine-to-machine, web of things, pervasive computing). A particular focus is put on technologies and platforms supporting these approaches: Arduino, Android, Zigby, etc.

## Semantic Web (5 ECTS - 40h)

Techniques to publish and deploy structured data on the Web. Tools and technologies for consuming and managing Web data, as well as knowledge representation and reasoning on the Web.

## Multiagent Coordination (4 ECTS - 20h)

Coordination mechanisms and models (e.g. DCOP, Auctions, Orchestration) to be used in the design and development of decentralised and distributed systems composed of autonomous agents

## CPS2 Project (4 ECTS - 40h)

For a selected application domain, major issues in the development of Cyber-physical social applications (e.g. transport, smart cities, energy, health)

## Internship Opportunities

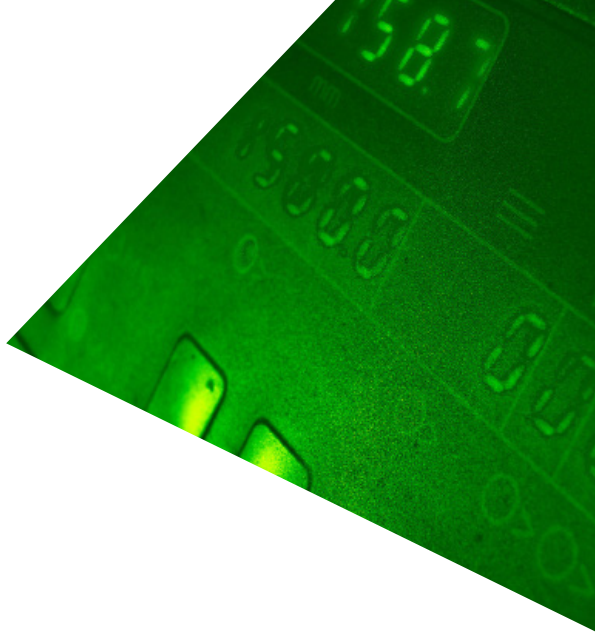
- Design a generic solution based on an organizational Multiagent model for the transition of autonomous vehicles at an urban junction.
- Distributed resource allocation algorithms for limited-communication devices.
- Handling custom data types in semantic web standards for question answering

## PhD Opportunities

- Spontaneous coordination of connected objects in the internet of things
- Weaving a social web of things: enabling autonomous and flexible interaction in the internet of things
- Multi-agent based context management middleware in support of ambient intelligence applications

## Job Opportunities

- Researchers for the development of CPS systems.
- Functional consultants
- Project managers for transport, energy, health applications





## Requirements for applicants

- Prior successful completion of a first year of a Master's Degree in theoretical and / or applied science, or equivalent diploma (at the home university or Ecole des Mines) / or 240 ECTS validated
- A good command of English is mandatory

## With the collaboration of the Connected Intelligence Research team

**The Connected Intelligence Research Team of the Laboratory Hubert Curien UMR CNRS 5516, with academics from MINES Saint-Etienne, Télécom Saint-Etienne and Université Jean Monnet.**

**12 permanent staff  
4 postdoctoral research fellows  
18 PhD students  
2 research engineers**

The team works on definition of models, algorithms and software architectures to support the inter-connection of physical, digital and social worlds in an open and decentralised context.

We develop scientific skills in Web of Data, Semantic Web, Multi-Agent Systems, Web of Things, Virtual Communities, Recommendation Systems, Trust and Privacy. The team develops contact with industrial partners like Renault, Orange, Engie, 1D Lab ...

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