

SCIENCES, TECHNOLOGIES, SANTÉ

IT for Smart and Sustainable Mobility (IT4SSM)

Master Informatique



**Niveau d'étude
visé**
BAC +5



ECTS
120 crédits



Durée
4 semestres



Composante
INSA Hauts-de-
France, UPHF



**Langue(s)
d'enseignement**
Anglais

Présentation

The Information Technology for Smart and Sustainable mobility (IT4SSM) program offers a unique combination of European courses in the Information Technology domain for the areas of smart technologies dedicated to smart cities applications with a specific attention to the sustainability of the designed solutions. This Computer Science Master program aims to provide knowledge and practical training as ITs in the new context of intelligent mobility while considering current issues of ethics and sustainable development. Smart mobility requires expertise in new techniques and technologies (Internet of Things, distributed data management, security of exchanges, etc.) and skills for the analysis, design and development of new algorithms and software for decision support in smart cities.

This Master's degree is the very first program to be offered in the framework of the EUNICE European University alliance. This program includes courses taught by four of the alliance's European partners, enabling students to benefit from their respective expertise.

Courses are provided by :

- Université Polytechnique Hauts-de-France (France)
- University of Cantabria (Spain)
- Poznan University of Technology (Poland)
- University of Vaasa (Finland)

Courses taught in English (B2 level required)

Course location (FI and FA) Initial training / Continuing Education :

- Campus Le Mont Houy Valenciennes (France)
- University of Cantabria (Spain) (to be confirmed)

Savoir-faire et compétences

Skills and competencies :

Targeted skills:

- Design, develop and deploy software solutions for sustainable mobility taking into account the legislative context and an ethical perspective;
- Create and produce smart solutions for resilient sustainable mobility
- Design, implement and deploy secure, sustainable and resilient communication networks and services in the mobility context
- Manage project and teams in the smart, sustainable mobility context
- Contribute to solutions and work as part of a professional team in the context of intelligent, sustainable mobility.
- Communicate with foreign teams and clients in the context of smart and sustainable mobility projects
- Cultural openness and general culture

Organisation

Admission

Conditions d'admission

ADMISSION REQUIREMENTS :

For the first year - Master 1 : open to students with Bachelor degree in computer science (after a licence / bachelor), or another engineering or technology specialty that fulfills the following requirements. Design and programming skills in C or equivalent, and highly desirable in Java or equivalent object oriented language.

At least B2 level; equivalent skills in English (ability to attend courses delivered in English).

For the second year - Master 2 : open to students with Bachelor degree in computer science plus a first year of master or equivalent, with sufficient skills for each of the following courses: programming, optimization algorithms, sustainable mobility, mobile application development, network security, cryptography and machine learning.

At least B2 level; equivalent skills in English

Application procedure :

Application is based on a registration file including previous diploma scores, and possible interview.

To apply :

• European students : - Master 1 :  [Mon master](#)

- Master 2 :  [Ecandidat](#)

• Non European students :  [Etudes en France](#)

When the required diploma is not available, possibility of validating (fully or partially) equivalent diploma (VAPP or professional skills (VAE).

Contact :  formation.continue@insa-hdf.fr

Droits de scolarité

Tuition fees : Consult tuition fees  [here](#)

Et après

Finalité Master : Professionnel, Recherche

Poursuite d'études

Further studies :

Graduates can go into research, preparing a PhD thesis in a company or research laboratory in computer science.

Insertion professionnelle

Professional integration :

- Graduates of this specialization will have the opportunity to work in the public institutions and companies interested in sustainability issues.
- They will be able to occupy positions as software and data engineer, system integrator, mobility manager.

Intitulés métiers visés

Targeted job titles :

- Software and data engineer: Design, implementation and deployment of sustainable and resilient services for smart mobility. Data analyst.
- System integrator: Engineer offering turnkey solutions integrating ICT leveraging on AI/ML and optimization techniques applied to the urban context.
- Mobility manager: Professional offering sustainable smart solutions conciliating legal, social, ethical and business components.

The graduates may apply for research programs.

Infos pratiques

Contacts

Master IT4SSM (EUNICE Alliance)

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✉ master-it4ssm@uphf.fr

Contact Formation Continue

✉ formation.continue@insa-hdf.fr

Laboratoire(s) partenaire(s)

Partner laboratory : Laboratory of Industrial and Human Automation Control, Mechanical Engineering and Computer Science (LAMIH UMR CNRS 8201), France - Department of Communications Engineering, Universidad de Cantabria, Spain. - Mathematics & Computation: Foundations, Learning, Artificial Intelligence, Spain - Department of Transport, Project Technology and Processes, Universidad de Cantabria, Spain - Department of Electronics Technology, System Engineering and Automation, Universidad de Cantabria, Spain - Laboratory of modeling and simulation for transport systems, Poland

Programme

Organisation

Program :

The content of the master IT4SSM covers different IT topics for the development of sustainable and mobile applications.

The aim is to train the student in decision making :

- based on data, from IoT, embedded and distributed devices, ...
- with security considerations
- assisted by ethical, human-centered AI (ML, agent, ...) and Operational Research (optimization, problem solving) methods and tools (modeling & simulation of the services, digital twin)
- with human (HCI, VR, personalization, citizen participation) and environmental (sustainability, impact study) approaches,
- with legal and business considerations
- applied in the mobility domain (urban services part)

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- University of Cantabria, Spain (UC)
- Poznan University of Technology, Poland (PUT)
- University of Vaasa, Finland (UVA)

Distance learning : Hybrid mode (face to face for some courses and distance learning for others)

Liste des principaux enseignements

Main courses :

- Data engineering : agent-based modeling and simulation for sustainable and mobile application
- Edge and mobile computing for sustainability
- Traffic and transportation modeling
- Environmental, social & economic impact of mobility solutions
- Internet of Things, services and applications
- Machine learning

- Human Computer Interaction for sustainable and mobile application
- Network security
- Smart mobility: ethics and legal issues, transport engineering and spatial development

First year

Semester 7

	Nature	CM	TD	TP	Crédits
Smart mobility: Ethics and Legal Issues, Transport Engineering and spatial development	UE				4 crédits
Human Computer Interaction for sustainable and mobile application	UE				4 crédits
Edge & Mobile Computing for sustainability	UE				4 crédits
Stochastic Processes/Queueing Systems : Modeling and Algorithms	UE				4 crédits
Computer Networks	UE				4 crédits
MLVE : Foreign Language course	UE				4 crédits
MP : Sustainable mobility (EUNICE shared course)	UE				4 crédits
MO : Opening course	UE				2 crédits

Semester 8

	Nature	CM	TD	TP	Crédits
Data engineering for sustainable and mobile application	UE				4 crédits
Traffic and transportation modeling	UE				4 crédits
Optimization fundamentals	UE				4 crédits
Cryptography fundamentals	UE				4 crédits
Network security	UE				4 crédits
MLVE : Foreign Language course	UE				4 crédits
MP : Machine Learning (EUNICE shared course)	UE				4 crédits
MO : Opening course	UE				2 crédits

Second year

Semester 9

	Nature	CM	TD	TP	Crédits
Environmental, social & economic impact of mobility solutions	UE				4 crédits
Agent-based modeling and simulation	UE				4 crédits

Game Theory Fundamentals	UE	4 crédits
Internet of Things, Services and Applications	UE	4 crédits
Security management	UE	4 crédits
MLVE: Foreign Language course	UE	4 crédits
MP: Statistics & Data mining (EUNICE shared course)	UE	4 crédits
MO: Opening course	UE	2 crédits

Semester 10

	Nature	CM	TD	TP	Crédits
Project	UE				10 crédits
Internship mobility	UE				20 crédits