



SCIENCE, TECHNOLOGY, HEALTH

## M2 Industry 4.0

Master Computer science



ECTS  
60 credits



Duration  
1 year



Component  
Collège  
Sciences et  
Technologies  
pour l'Energie et  
l'Environnement  
(STEE)



Language(s)  
English

## Presentation

[Apply here from October to March](#)

The aim of this master's is to train Computer Sciences and Information Technologies experts in order to be able to address the new challenges of the current and future generations of digital societies. Current trends in digital technologies represented by the Internet of things, cyber-physical systems, social networks, cloud computing, big data and cognitive computing, mobile robotics, digital twin, and additive manufacturing have provided the basis for a new industrial revolution named Industry 4.0.

Our **Industry 4.0 Computer Sciences Master's** degree offers a 1 year, full-time postgraduate program, aimed at providing solid scientific and technological foundations in order to innovate, design, and develop future digital organizations based on the new Smart Anything Everywhere (SAE) paradigm. It is suited for students planning both an academic or an industrial career and provides the theoretical basis and the practical expertise required to pursue research or R&D organizations.

The master's is fully taught in English providing a main core curriculum and two options named IT Digital Transformation and Digital Manufacturing.

This master's is hosted by the College of Sciences and Technologies for Energy and Environment (STEE) of the Université de Pau et des Pays de l'Adour (UPPA) in Anglet (France) as well as by The National Engineering School of Tarbes (ENIT) of the National Polytechnic Institute of Toulouse, in Tarbes (France).

This master is supported by the prestigious French Initiative of Excellence label I-SITE (Initiatives Sciences, Innovation, Territories, and Economy) obtained by the E2S-UPPA project and profits from the territorial synergy of the Aerospace industry located in the southwest valley of France.

The program is carried out in close collaboration with the Computer Sciences Laboratory of the UPPA ([LIUPPA research laboratory](#)) and with the Production Engineering Laboratory of the ENIT ([LGP research laboratory](#)) as well as several R&D organizations, where scientific and experimental practicals will be performed.

Students will also benefit from the global research environment and administrative support of the [University Pau & Pays Adour](#), the [ENIT](#), and the [E2S I-site program](#).



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## Objectives

- \* Prepare students at an advanced specialized level to meet present and future scientific and technological challenges in digital industries and enterprises.
- \* Develop research skills to engage in quality and successful research,
- \* Prepare students for leading positions in private and public organizations in research and development departments.

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## Your university

Pau

Tarbes

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## Skills

At the end of this program, the students in the « **Industry 4.0 Computer Science Master** » will be able to:

- \* Identify and analyze the functional and non-functional requirements of digital organizations (industries and enterprises).
- \* Design and model multi-dimensional architectures resulting from the integration and coordination of Internet of Everything entities (IoT, Data, People, Services, Cloud Computing infrastructures, robots, 3D printers, etc.) aimed at satisfying the requirements of digital organizations.
- \* Develop and implement a proof of concept system integrating the various Internet of Everything dimensions.
- \* Design and conduct experiments in order to test and evaluate Industry 4.0 systems.
- \* Review, analyze, and interpret the body of scientific literature, contemporary issues, and innovations in computer sciences and information technologies disciplines.

- \* Carry out a research project aimed at developing a state-of-the-art as well as identifying and solving scientific and technological challenges within the context of Industry 4.0.

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## Additional information

**Program intensity:** Full-time

**Duration:** 1 year

**Languages:** Fully taught in English

**Delivery mode:**

- \* On Campus at STEE College and LIUPPA Laboratory (**Anglet**) for the IT Digital Transformation option.
- \* On Campus at ENIT and LGP Laboratory (**Tarbes**) for the Digital Manufacturing

*This program is open to  
work-study and lifelong  
learners.*

### Scholarships

- \* [EIFFEL Scholarship of Excellence](#)
- \* [Talents' Academy Grants](#) | 🇫🇷
- \* [Catalogue des Bourses Campus France](#) | 🇫🇷

### The International Master Programs Admission Office

[master.programs@univ-pau.fr](mailto:master.programs@univ-pau.fr)

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## Organisation

## Organization



Master 2 Computer Sciences: Industry 4.0		
Academic Semester 1		
Core Curriculum		
Course Title	Course Description	ECTS*
Industry 4.0 cyber-physical Systems Engineering & Innovation	This course is designed to allow learners to acquire theoretical and practical competencies to understand and to carry on requirements analysis and design of systems, integrating referential models of system engineering and methodologies well adapted for Cyber-Physical Systems of Industry 4.0. The course will follow a project-based oriented teaching methodology.	4

Business Intelligence and Business Analytics	This course aims at providing students with the foundations and developing competencies in designing data flow paths allowing the construction of multi-dimensional data warehouses as well as the implementation of machine learning techniques in order to implement diagnosis, prediction, and prescription models for smart systems.	4
Research Initiation	This course is designed to provide students with theoretical and practical skills to carry out a research project and in particular to	3



	<p>understand and be able to accomplish:</p> <ul style="list-style-type: none"> <li>* Analysis of a context and formulation of a problem</li> <li>* Study and analysis of the state-of-the-art and existing solutions</li> <li>* Propose solutions and/or recommendations</li> <li>* Research articles production and evaluation.</li> </ul>	
French as a Foreign Language, English	This course aims at acquiring competencies in both written and oral communication in French or English.	3

IT Digital Transformation option (UPPA ANGLET Campus)		
Service and Micro-Service Oriented Architectures	This course aims at providing students with the concepts and approaches for understanding and designing distributed systems allowing them in particular understand and to apply service-oriented and micro-services-oriented methods for designing and developing heterogeneous systems and systems of systems. Integration and interoperability solutions will be studied and applied.	4
Cloud Computing Services and	The aim of this course is to provide	2



Technologies I	students with the knowledge and competences in order to design and develop scalable, secure, and cost-efficient infrastructures, platforms, and software as a service for digital organisations. This course is about virtualization and Dock containers.			designing at the infrastructure, middleware, and software levels.	
Cloud Computing Services and Technologies II	The aim of this course is to provide students with the knowledge and competencies in order to design and develop scalable, secure, and cost-efficient infrastructures, platforms, and software as a service for digital organizations. This course is about	2	Internet of Things	<ul style="list-style-type: none"> <li>* The aim of this course is to provide students with the knowledge and competencies in order to design and develop Smart IoT systems based on the integration and orchestration of sensors and effectors objects of cyber-physical systems such as : <ul style="list-style-type: none"> <li>* Explain how businesses can extract information and insights</li> </ul> </li> </ul>	4



	from IoT Data. <ul style="list-style-type: none"> <li>* Understand the steps of the Data Analysis Lifecycle and perform these tasks.</li> <li>* Explain the different types of data analytics: descriptive, predictive, and prescriptive.</li> </ul>			information systems.	
			<b>Digital Manufacturing option (ENIT Tarbes Campus)</b>		
			Advanced Robotics	At the end of this course, the student should be able to analyze a given application in order to establish a robotic/cobotic solution to automatize it by considering different aspects and constraints. From this training, the student will be also able to explain robotics tools (models, trajectory generator, and control law), use them, and justify their choices in a specific context.	4
Semantic Web, Advanced Databases, and Open Linked Data	This course aims to provide students with basic skills for designing and developing structured and unstructured advanced databases to cope with the heterogeneous data plane dimensions required by the generations of	4		Some specific aspects	



	related to robotics in interaction and collaboration with humans will be addressed as well.				
Advanced virtual environments	The aim of this course is to present the basic concepts of Virtual Reality (such as hardware interfaces, software functionalities, or development environments), as well as some recent scientific and applicative advances of Virtual Reality in the framework of industry 4.0, and digital twins.	4			in-depth 3D metal printing (technical limitations, detailed costs, defects causes/ solutions), to explore the topological design methods and the process simulation/ monitoring, with professors and 3 industrial partners, and ending with an application project.
				Advanced Distributed and Embedded Systems	The aim of this course is to present and manipulate processors (e.g. FPGA, micro-controller, Arduino, ESP) in charge of treating information coming from sensors (including
Advanced Additive Manufacturing	The aim is to provide technical bases on 3D printing, current and futures technologies, to analyze	4			4



	lighting systems, signals, and images) using a wireless interface (e.g. BLE, WIFI) as well as enabling the control of distributed intelligent systems through actuators or effectors.	
<b>ACADEMIC SEMESTER 2 INTERNSHIP</b>		
Research Internship	<p>This internship is intended to allow students to apply a scientific approach and project management methodologies for an academic or industrial research project.</p> <p><i>Examples of application domains :</i></p>	30

	Industry 4.0, Smart Manufacturing, Autonomous Vehicles, Smart Building, Smart Enterprises including Business Intelligence and Business Analytics (Machine Learning)	
* ECTS: European Credit Transfer and Accumulation System		

## Trainings

**Internship** : Mandatory

**Internship duration** : 5-6 months

**Abroad internship** : Optional

## Admission

### Admission requirements

#### Academic requirements

This second year of the Master's degree is open to students after completion of the first year of a Master's degree or Diploma equal to bac+4 from a European





university (minimum of 240 ECTS credits) in Engineering, Science, or Equivalent ( Bachelor of Engineering, Bachelor of Science or Equivalent).

#### Admission requirements

Applicants must be fluent in English, both in writing and speaking. An applicant whose native language is not English has to take a recognized international English test.

## English Language Requirements

**Minimum required score:** CECRL B2 | 🗣️ level in English

## Tuition Fees and partial exemptions

Administrative tuition in France is determined at a national level. The French Ministerial Order of April 19, 2019, amended on June 9, 2020, sets university tuition for a Master's Program as follows: European nationals: **€243**, extra-European nationals: **€3770**.

For the academic year 2022-2023, the Board of Directors has extended its policy of automatically providing a **partial reduction of these fees at the UPPA**. As a result, extra-European nationals will be granted automatic partial reductions such that **they will be able to pay the same enrollment fees as European nationals**.

#### Extra fees:

In addition to academic tuition, most students must pay a student body fee (CVEC, which cost €92 in 2020-2021).

*NB: Admitted candidates in any course of study who have taken a break of more than two years from their studies will enroll via the UPPA's **Continuing Education service** (Formation Continue / FORCO). They are exempt*

*from the CVEC, however, they may be subject to a different tuition scale.*

## Student capacity

20

## And after

### Further studies

#### Sectors

- \* Computer Science, Information Technologies, Systems Engineering, Digital Mentor, Collaborative Robots Expert, IT/OT Integration Manager, Industrial Big Data Scientist, Lean 4.0 Engineer

#### Fields

- \* Industry, Research, and R&D structures

#### Positions

- \* Ph.D. student and R&D Engineer

## Useful info

### Contacts

#### Administration contact

M2 Industry 4.0

✉️ masteri40@univ-pau.fr

#### Head of Teaching

Ernesto Exposito Garcia

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## Partner schools

### ENIT

<https://www.enit.fr/fr/formations/masters/master-industry-4-0-1.html>


### LIUPPA

<http://liuppa.univ-pau.fr/fr/index.html>

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## Place

 Anglet

 Tarbes

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## Campus

 Anglet

 Tarbes



# Program

Industry 4.0 Semester 9