Major	Industrial Engineering		
Master's programme	KNOWLEDGE INTEGRATION IN MECHANICAL PRODUCTION ADVANCED PRODUCTIN SYSTEMS		
Master's Code	KIMP_APS		
Qualification awarded	**Master's degree in Industrial Engineering**		
Programme director	**PhD. Adel OLABI (adel.olabi@ensam.eu)**		
Mode of study	*Level of qualification*	*Field of study*	*Language of study*
Full Time	**Master ISCED 7**	**Engineering ISCED-F-07**	**English**
ECTS	*Campus*	*Length of programme*	*Specific arrangements for recognition of prior learning*
60	**Lille**	**1 year (from October to September)**	**No**
Keywords	**Industry 4.0, Mechanical Engineering, Industrial Engineering, Mechatronics, Robotics, Machine Learning, Dynamics, Modelling, Automatic Control, Numerical Simulation.**		

Admission requirements

Type	Level	Way
English proficiency	**Level B2**	**Certificate**
Previous degree	**First-year of Master's (M1) minimum, or equivalent, in Engineering**	**Certificate of achievement**

Applicants interested in the KIMP_APS programme must follow the online procedure and adhere to the schedule.

https://artsetmetiers.fr/en/formation/master-admissions

Overall objectives

Identifying and formalizing the Knowledge based on a scientific approach about design, innovation, production planning and manufacturing systems. The KIMP program provides training for further PhD studies, research activities or positions in industry as an expert with having an international experience by working in an international and multicultural context

- Designing product and process: Innovation, conceptual design, eco-design, detail design, geometric modelling, structure analysis, integrated design and manufacturing, cost, and risk estimation
- Developing Knowledge engineering and integration: Big data management, Knowledge management, collaborative design, capitalization and extraction of the Knowledge, digital mock-up, and virtual environments

Programme learning goals

The table below details the abilities to be acquired and the expected proficiency levels according to the following grading scale:

1) To have experienced or been exposed to the current and future challenges for integrated design by considering current and future manufacturing paradigms (robotics, augmented and virtual reality, big data, …).
2) To be able to participate and contribute to develop transversal approaches coupling design, simulation, integration and control of both products and manufacturing systems.
3) To be able to understand, explain and manipulate the concepts, methods, models, and tools required (with the help of computer science: Augmented and virtual realities, AI data and rules driven approaches).
4) To be skilled in the practice and implementation of methods, models, and tools i) to model the product and its characteristics, ii) to identify and manage the links between its parameters and the ones from its environment during its whole lifecycle, iii) to manufacture them.
5) To be able to lead or innovate in the scope of the new industrial paradigms by having a global and systemic viewpoint.

Sets of expected abilities	***Expected abilities***	***Expected proficiency level***
		R&D
Disciplinary knowledge and reasoning	**1.1 Knowledge of underlying mathematics and science**	**4**
	1.2 Core fundamental knowledge of engineering	**3**
	1.3 Advanced engineering fundamental knowledge, methods and tools	**3**
Personal and professional skills attributes	**2.1 Analytical reasoning and problem solving**	**4**
	2.2 Experimentation, investigation and knowledge discovery	**4**
	2.3 System thinking	**4**
	2.4 Ethics, though and learning	**4**
	2.5 Ethics, equity and other responsibilities	**5**
Interpersonal skills: Teamwork and communication	**3.1 Teamwork**	**4**
	3.2 Communications	**4**
	3.3 Communications in foreign language	**4**
Conceiving, Designing, implementing, operating, innovating and entrepreneurship in the context of Corporate Social Responsibility	**4.1 External, societal and environmental context**	**4**
	4.2 Enterprise and business context	**2**
	4.3 Conceiving, systems engineering and management	**4**
	4.4 Designing	**5**
	4.5 Implementing	**4**
	4.6 Operating	**4**
	4.7 Leading engineering endeavours	**3**
	4.8 Engineering entrepreneurship	**2**

More specifically, the **key strengths** of the KIMP_APS programme are as follows:

- Deep theoretical knowledge on the main concepts, methods, models, and tools involved in advanced production systems design and control.
- International exposure through the courses taught in English and several exchanges programs (double degree and ERASMUS exchanges programs) with other foreign students from partner universities.
- Courses and Internship supervisions taking advantage of Arts et Métiers network (14 laboratories and research teams). You will interact with specialists of this network!
- Transversal adaptation, integration, analysis, critical thinking, self-learning, communication, valorisation and organizational skills gained when confronting to both academic and industrial multi-disciplinary projects.

Programme structure

Learning outcomes are reached through a well-balanced training program that combines theoretical and practical learning sequences, during which students are placed in both academic and real-life industrial configurations, in order to develop multiple transversal skills.

The KIMP_APS program is a one-year Master of Science program that spreads on two semesters

- **Fall semester (S3): From October to January**
  This semester is dedicated to lectures and courses. These ones are composed by 4 scientific core courses of 12h each, 4 specialisation scientific modules 24h each, 1 language module of 24h, 2 professional courses, for a total of 30 ECTS.
- **Spring semester (S4): From February to September**
  The second semester is dedicated to the Master thesis, a scientific project of 6 months and 30 ECTS. The internship can be made in a company or a laboratory in France or abroad.

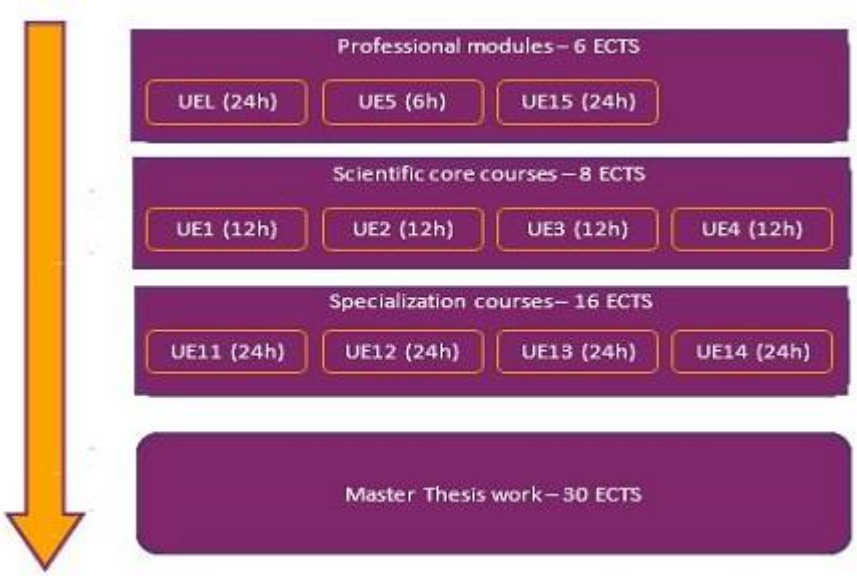

Figure 1 : Structure of the KIMP_APS programme.

Code	Title	Sem.	Year	ECTS	Hours	Compulsory/ Optional	Teaching modalities
UE1 (S)	Methods, models for the integration of product and manufacturing process	S3	M2	2	12	Compulsory	Course/Exercises/Project

Code	Title	Sem.	Year	ECTS	Hours	Compulsory/ Optional	Teaching modalities
UE2 (S)	AI tools for integrated design	S3	M2	2	12	Compulsory	Course/Exercises/Project
UE3 (S)	Modelling and control of mechatronics devices	S3	M2	2	12	Compulsory	Course/Exercises/Project
UE4 (S)	Manufacturing process management	S3	M2	2	12	Compulsory	Course/Exercises/Project
UE5 (P)	Literature review	S3	M2	1	6	Compulsory	Course/Exercises/Project
UEL (P)	Language and culture	S3	M2	2	24	Compulsory	Course/Exercises/Project
UE11(S)	Modeling and Analysis of Dynamic Mechanical Systems	S3	M2	4	24	Compulsory	Course/Exercises/Project
UE12 (S)	Control of Dynamic Systems	S3	M2	4	24	Compulsory	Course/Exercises/Project
UE13 (S)	Advanced Mechatronics	S3	M2	4	24	Compulsory	Course/Exercises/Project
UE14 (S)	Robotics	S3	M2	4	24	Compulsory	Course/Exercises/Project
UE15 (P)	Team building and Management	S3	M2	2	24	Compulsory	Course/Exercises/Project
LR	Literature review work	S4	M2	6	N/A	Compulsory	Internship
MT	Master thesis	S4	M2	24	N/A	Compulsory	Internship

Table 1 : Detail of the modules of the KIMP_APS programme over the two semesters.

Study and assessment rules

Each module can be evaluated by means of practical works, projects, reports, oral presentations, exams and the assessment rules are explained at the beginning of the programme. Each module is evaluated between 0 and 20.

For the 4 professional and language modules

- The final mark of each professional/language module must be ≥ 10, and there is no compensation between the modules.

For the 8 scientific modules

- The final mark of each scientific module must be ≥ 10

For master thesis

- The final mark of the master thesis must be ≥ 10

Retake exams are organized at the beginning of the second semester.

Graduation requirements

To be graduated, students need to comply with the following rules:

Master 2

- Validate 30 ECTS during the first semester
- Validate 30 ECTS during the second semester

At the end of the KIMP_APS programme, the final average is calculated based on the ECTS distribution of only scientific courses, and mentions are awarded (very good, good, fair, passable) based on results and behaviour.

Careers of graduates and access to further studies

Depending on their results and professional expectations, graduate students can continue their professional careers as a:

- Careers mainly in medium and large companies in industry as engineer/researcher, in numerous sectors (manufacturing, product design, services, consultancy) and fields (aeronautics, automotive, IT, transportation, energy, construction, health, plastics, and metallurgy)
- Positions: project and process manager, consultant, researcher, head of R&D department
- PhD positions in France or abroad in academia or in industry (CIFRE)