

# COURSES CATALOGUE FOR EXCHANGE STUDENTS

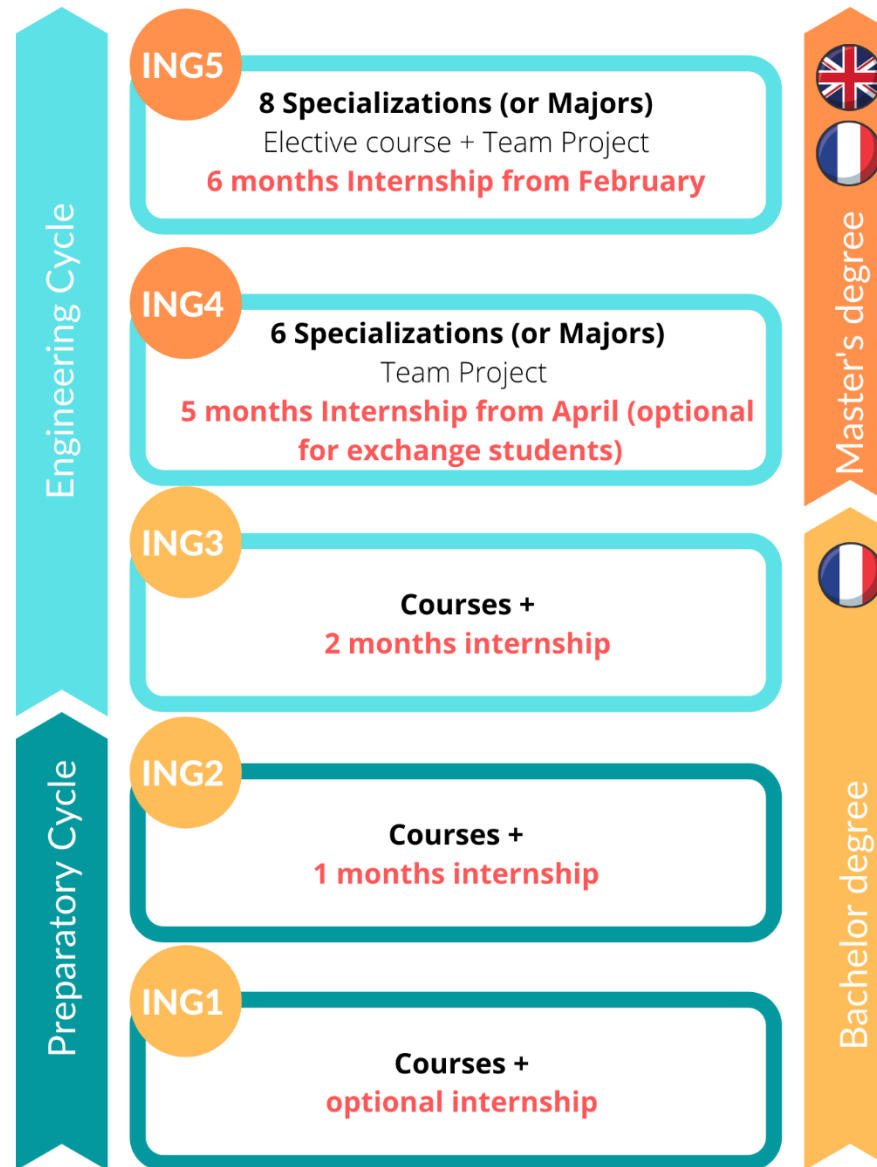


2021-2022

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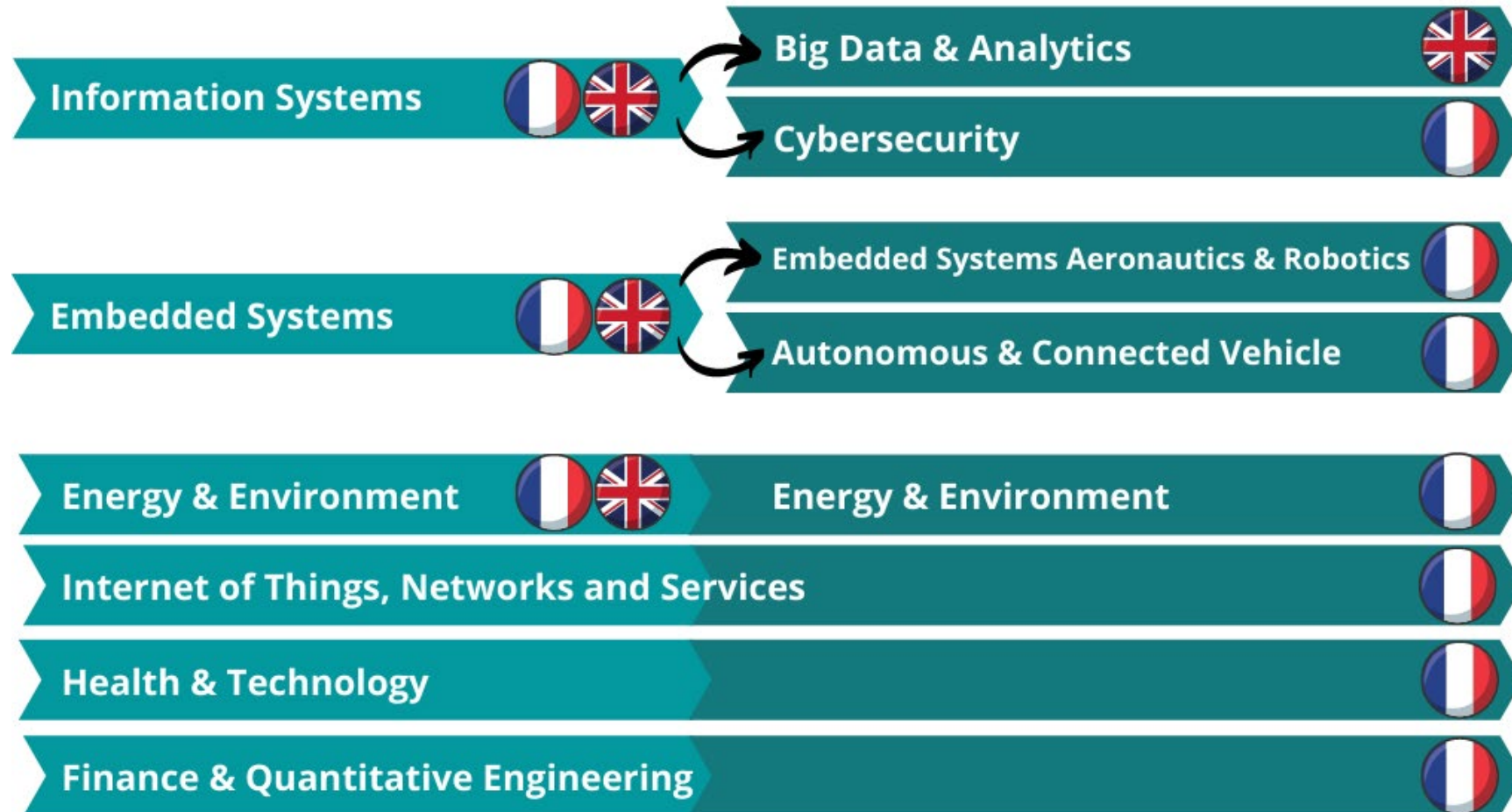
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## ENGINEERING PROGRAM AT ECE



# ING4

# ING5



## ING 4 –Master 1

### Fall - ING4 - Information Systems

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S7 Fall	Major/Specialization	Web Technologies	3,5	FR or EN	September to December  Retake exams in February
			Advanced Databases	3,5		
			Operating Systems	3,5		
			Computer Networks 1	3,5		
			DevOps with SRE	3		
		Soft skills	Budget Management	1		
			Team Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
			Minor*		FR	
				<b>30</b>		

\* If you do not have a B2 level in French your minor will be French as a foreign language.

If you have a B2 level in French, you will be able to choose between 7 Minors:

Mineure Entrepreneuriat / Minor in Entrepreneurship

Mineure Management d'une organisation et management par projet (GOMP) / Management and Organization Minor

Mineure Marketing / Minor in Marketing

Mineure Métiers de la Création Numérique / Minor : Digital Media and Design

Mineure Négociation commerciale / Business Negotiation Minor

Mineure Projet Personnel / Individually Designed Minor

Mineure Recherche & Développement / Minor in Research and Development

## Fall - ING4 – Embedded Systems

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S7 Fall	Major/Specialization	Technical Project	3	FR or EN	September to December  Retake exams in February
			Advanced programming in C	3		
			Microcontrollers	3		
			Digital Signal Processors	3		
			Embedded Linux	3		
			Analysis and design with SCADE	2		
		Soft skills	Budget Management	1		
			Team Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
			Minor*		FR	
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**Fall - ING4 – Energy & Environment**

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates	
4th – Master 1	S7 Fall	Major/Specialization	Applied Chemistry	2	FR or EN	September to December  Retake exams in February	
			Physics for Energy 1	2			
			Fossil Fuel : Combustion	2			
			Introduction to Embedded Systems (Project)	2			
			Energy Markets	2			
			Ergonomics & User Experience	2			
			Renewable Energy 1	3			
			Oil & Gas Industry	2			
		Soft skills	Budget Management	1			
			Team Management	1			
			English	1			
		Project	PPE Project	8			
		Minor	French as a foreign language	2			EN
			Minor*				FR
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Mineure Recherche & Développement / Minor in Research and Development

**Fall - ING4 – Internet of Things, Networks and Services**

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S7 Fall	Major/Specialization	IP networks	3	FR	September to December  Retake exams in February
			Information systems urbanization	1		
			UX Design	3		
			Web Technologies	3		
			Bootcamp	1		
			IoT	3		
			Human-focused Design	3		
		Soft skills	Budget Management	1		
			Team Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
			Minor*		FR	
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Fall - ING4 – Health & Technology

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S7 Fall	Major/Specialization	Cardiovascular system	1	FR	September to December  Retake exams in February
			Respiratory and renal physiology	1		
			ENT and ophthalmic system	1		
			Ultrasound imaging	1.5		
			Mechanical	2.5		
			Ionizing radiation imaging	1.5		
			Health Care Institutions in France	1.5		
			Evaluation of a medical device	1.5		
			Conduite de projet santé	0		
			Cardio stimulation	1		
			Monitoring of vital functions	1		
			API and webservices	1		
			Treatment / analysis of physiological signals	2.5		
		Soft skills	Budget Management	1		
			Team Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
			Minor*		FR	
				<b>30</b>		

**Fall - ING4 – Finance & Quantitative Engineering**

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S7 Fall	Major/Specialization	AMF Certification	3	FR	September to December Retake exams in February
			Introductory Monte Carlo	2		
			Variational calculus	2		
			Machine Learning algorithms	3		
			Regulatory measures of risk	3		
			Practice of VBA	2		
			Online Corporate finance	2		
		Soft skills	Budget Management	1		
			Team Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
			Minor*		FR	
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Mineure Projet Personnel / Individually Designed Minor

Mineure Recherche & Développement / Minor in Research and Development

## Spring - ING4 - Information Systems

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates	
4th – Master 1	S8 Spring	Major/Specialization	Machine Learning 1	3.5	FR or EN	January to mid-April  Retake exams in May	
			Information Systems Security	3.5			
			Computer Networks Security	3			
			Management of Information Systems	1			
			Mathematics for Data Scientist	3			
			Microsoft C#	3			
		Soft skills	Individual Relationship Management	1			
			Corporate Management	1			
			English	1			
		Project	PPE Project	8			
		Minor	French as a foreign language	2			EN
			Minor*				FR
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Mineure Management d'une organisation et management par projet (GOMP) / Management and Organization Minor

Mineure Recherche & Développement / Minor in Research and Development

Mineure Projet Personnel / Individually Designed Minor

Mineure Marketing / Minor in Marketing

Mineure International / Minor in International Studies,

## Spring - ING4 – Embedded Systems

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates	
4th – Master 1	S8 Spring	Major/Specialization	Drivers Linux	2	FR or EN	January to mid-April  Retake exams in May	
			Real Time	3			
			Digital circuit design FPGA-VHDL	3			
			Sensors & Interface	3			
			Industrial local networks	3			
			Computer networks	3			
		Soft skills	Individual Relationship Management	1			
			Corporate Management	1			
			English	1			
		Project	PPE Project	8			
		Minor	French as a foreign language	2			EN
			Minor*				FR
				<b>30</b>			

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Mineure Métiers de la Création Numérique / Minor : Digital Media and Design

Mineure Entrepreneuriat / Minor in Entrepreneurship

Mineure Management d'une organisation et management par projet (GOMP) / Management and Organization Minor

Mineure Recherche & Développement / Minor in Research and Development

Mineure Projet Personnel / Individually Designed Minor

Mineure Marketing / Minor in Marketing

Mineure International / Minor in International Studies

## Spring - ING4 – Energy &amp; Environment

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S8 Spring	Major/Specialization	Electrotechnics & Power Electronics	1.5	FR or EN	January to mid-April  Retake exams in May
			Physics for Energy 2	1.5		
			Web Project for Energy	1.5		
			Renewable Energy 2	2		
			Nuclear Energy	1.5		
			Introduction to Energy Conversion & Storage	1.5		
			Blockchain for Energy	2		
			Introduction to Niagara	2		
			Sustainable Development	2		
			Smart grid, Smart city, Smart everywhere	1.5		
		Soft skills	Individual Relationship Management	1		
			Corporate Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
Minor*	FR					
				<b>30</b>		

## Spring - ING4 – Internet of Things, Networks and Services

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S8 Spring	Major/Specialization	Mobile and radio networks	2	FR	January to mid-April  Retake exams in May
			IoT networks	2		
			Programming Mobile Applications	2		
			Prototyping platforms	3		
			Human-Machine new interactions	2		
			Introduction to 3D design	2		
			Quantum IoT	2		
			Introduction to Fablab tools	2		
		Soft skills	Individual Relationship Management	1		
			Corporate Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
			Minor*		FR	
				<b>30</b>		

Spring - ING4 – Health & Technology

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S8 Spring	Major/Specialization	Immunology and Physiology of biological Tissues	1.5	FR	January to mid-April  Retake exams in May
			Automatic	1.5		
			Medical Robotics	1.5		
			Prothesis 1	1.5		
			Interface Bio-artificiel	0		
			Dispositifs médicaux et propriété intellectuelle	1.5		
			Network and medical data connectivity	1.5		
			Image Processing	2.5		
			Health and Web interface	2.5		
			Programmation Labview	0		
			MRI	1.5		
			Laser Imaging	1.5		
		Soft skills	Individual Relationship Management	1		
			Corporate Management	1		
			English	1		
		Project	PPE Project	8		
Minor	French as a foreign language	2	EN			
	Minor*		FR			
				<b>30</b>		

## Spring - ING4 – Finance and Quantitative Engineering

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
4th – Master 1	S8 Spring	Major/Specialization	Cryptocurrency & regulations	2	FR	January to mid-April  Retake exams in May
			Blockchain practice	2		
			Stochastic calculus	2		
			Asset valuation & simulations	2		
			Bank accounting	2		
			Online bank funding	2		
			Python	2		
			Artificial intelligence	3		
		Soft skills	Individual Relationship Management	1		
			Corporate Management	1		
			English	1		
		Project	PPE Project	8		
		Minor	French as a foreign language	2	EN	
Minor*	FR					
				<b>30</b>		



## ING 5 –Master 2

### Fall – ING5 – Big Data & Analytics

(Spring is for internship)

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Business Intelligence	2,5	EN	September to December
			Real Time Big Data Search & Analytics	2		
			Machine Learning 2	2		
			Deep Learning	2,5		
			Big Data Ecosystem	2		
			Big Data Analysis with Spark	2		
			Big Data Analytics	3		
			Ethics of Artificial Intelligence	1		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1	FR	
		French	French as a foreign language	2	EN	
		Project	PFE Project	6	EN	September to February
				<b>32</b>		

Fall – ING5 – Cybersecurity

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Cybersecurity policies, standards and methodologies	2	FR	September to December
			Information Systems Security	2		
			Windows Security	3		
			Identity and Access Management	1.5		
			Identity and Access Management in Microsoft Environment	4.5		
			Incident Response, Forensics and Reverse Engineering	3		
			Cryptography	1		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1		
Project	PFE Project	6		September to February		
				<b>30</b>		

Fall – ING5 – Energy & Environment

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Industrial Risk Management	2	FR	September to December
			Smart Grids, Smart Metering & Big Data	1,5		
			Embedded energy storage systems	1,5		
			Digital Plant Design & Operation	2		
			Building Thermal Design & Efficiency	3,5		
			Advanced Home Automation	2		
			Environmental Regulation & Waste Management	1,5		
			Responsible Digital	1,5		
			Water Treatment & Management	1,5		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1		
Project	PFE Project	6		September to February		
				<b>30</b>		

Fall – ING5 – Finance & Quantitative Engineering

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Econométrie	2	FR	September to December
			Optimal control & Hamiltonians	2		
			Online International economics	2		
			Macroeconomics	2		
			Financial derivatives	2		
			Forecasting Techniques	3		
			Portfolio management in VBA	2		
			Trading & algorithms	2		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1		
Project	PFE Project	6		September to February		
				<b>30</b>		

Fall – ING5 – Internet of Things, Networks and Services

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Business and society	2	FR	September to December
			Voice UX	2		
			Edge computing	3		
			Blockchains technology	2		
			IoT Cloud Services	3		
			Hackathon	2		
			Micro-services	3		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1		
Project	PFE Project	6		September to February		
				<b>30</b>		

## Fall – ING5 – Health &amp; Technology

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Digital and reeducation	1	FR	September to December
			Handicap and technology	2		
			Physiological command	1,5		
			Medical Data	1		
			Physiopathology and biocompatibility	1,5		
			Spectroscopy UV-Visible	1		
			IOT and Health	1		
			Computer-assisted surgery	1,5		
			Health Information System, interoperability, telemedecine	2		
			Cellular biophysics	1,5		
			Neurosciences and implants	1		
			Microfluidics	1		
			Neurosciences	1		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
Change Management	1					
Project	PFE Project	6		September to February		
				<b>30</b>		

Fall – ING5 – Embedded Systems, Aeronautics and Robotics

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Cybersecurity	3	FR	September to December
			SIMULINK Workshop	2		
			Android	3		
			Embedded JAVA	3		
			Image Processing Technology	3		
			Parallel Programming	3		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1		
		Project	PFE Project	6		September to February
				<b>30</b>		

## Fall – ING5 –Autonomous &amp; Connected Vehicle

Year of study	Semester	Unit	Course name	ECTS	Teaching languages	Dates
5th – Master 2	S9 Fall	Major/Specialization	Electrical Vehicle System	2	FR	September to December
			Electronic System Architecture	2		
			Software Architecture	2		
			Electronic Architecture	2		
			Simulink Software Tool	2		
			Simulink Software Tool	2		
			Control Command	2		
			From sensor to GPS	2		
		Elective course	See page 25	5	FR/EN	
		Soft skills	Workplace Health, Safety and Security	1	FR	
			Change Management	1		
		Project	PFE Project	6		September to February
				<b>30</b>		



**Elective courses**

Elective course (OA)	Description	Teaching language	ECTS
Robotics	Automatique: DU PID au filtrage de Kalman, Intelligence Artificielle, Atelier Integration Système, Reconnaissane de forme, Pratique autour du robot Nao	FR	5
Nanotechnology	Cycle FondamentaCycle Fondamental (Nanosciences ), Cycle Appliqué (TP), Cycle de conférences par des chercheurs et des industriels	FR	
Scientific calculation	Optimisation mathématique et simulations, Description des algorithmes en optimisation, Mise en œuvre numérique des algorithmes, projet	FR	
Course design	Introduction à l'OA Design, Identité/Macro et micro-typographie, Atelier CV, Design workshops	FR	
Aeronautical	Principe de fonctionnement d'un avion, communication avionique, norme (DO178 DO255), Gestion du trafic aérien	FR	
Data Scientist	Introduction au Machine Learning et au Deep Learning : de la collecte des données à la mise en production de solutions opérationnelles.	FR	
Electric and hybrid vehicles	Conception et modélisation de véhicules basse-consommation (motorisation, système de stockage d'énergie, modélisation et simulation du fonctionnement du véhicule sous AMESIM)	FR	
Cloud architecting	Connaître les services <b>AWS</b> et leurs cas d'usage. Réaliser des <b>architectures AWS</b> complètes, respectant les bonnes pratiques et les patrons de conception.	EN	
Personal project	/	FR	
Business process automation	Découvrir la plateforme Pega Infinity™, et être certifié sur ses deux premiers modules : System Architect, Data Scientist	EN	
Quantum technologies and computing	Développer des compétences d'ingénieur avec bases en physique quantique, Apprendre la programmation « Quantique ». Avoir des notions en calcul quantique, cryptographie quantique et métrologie quantique.	FR	