COURSE OFFER FOR EXCHANGE STUDENTS

Academic year 2023-24

MINES PARIS | PSL

COURSE OFFER

Important information to keep in mind when choosing courses

- Mines Paris offers only graduate programmes:
  - Master's Degree in Science and Executive Engineering (Grande Ecole Programme) – Graduate year 1
  - Master in Energy – Graduate year 1 and year 2
  - Master in Material Science and Engineering (SGM) - Graduate year 1 and year 2
- You cannot mix courses from different semesters, different programmes and different levels of study.
- Sometimes courses are offered within modules and if you want to take these courses you will have to take the entire module. Please ask if you are not sure.
- Once you select a tack in Master SGM, you can only take courses within this track.
- Mines Paris imposes a minimum requirement of 20 ECTS credits per semester for exchange students. Double-degree students must take 30 ECTS per semester.
- Each course is validated by acquiring ECTS (European Credit Transfer System).
- Please be informed that there might be changes in the course offer.

PROGRAMMES' LIST

Programmes' List	Teaching language	Fall semester	Academic Year	Spring semester only
Master's Degree in Science and Executive Engineering - Second Year	French	Yes	Yes	Yes
Master's Degree in Energy - Year 1	French/English	Yes	Yes	Yes
Master's Degree in Energy - Year 2	English	Yes	Yes	No
Master's Degree in Materials Sciences and Engineering - Year 1	English	No	No	Yes
Master's Degree in Materials Sciences and Engineering - Year 2 - MAGIS	English	Yes	Yes	No
Master's Degree in Materials Sciences and Engineering - Year 2 - MADI	English	Yes	Yes	No
Master's Degree in Materials Sciences and Engineering - Year 2 - Microflu	English	Yes	Yes	No

PROGRAMME IN FRENCH

Master in Science and Executive Engineering

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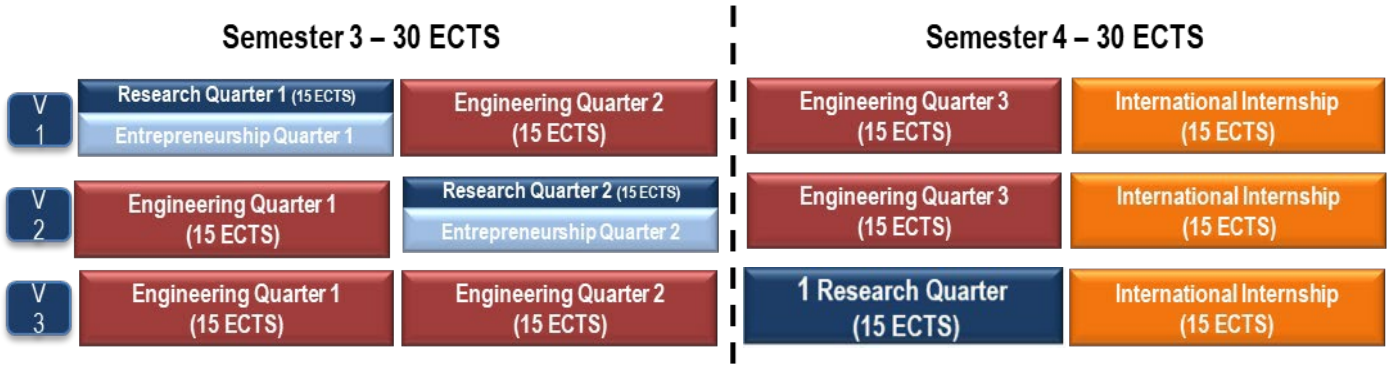
MASTER'S DEGREE IN SCIENCE AND EXECUTIVE ENGINEERING

Structure of Second Year Graduate – FRENCH

The first year of Graduate is composed of two semesters (S3 = Fall starting in September and S4 = Spring starting in February), each of them divided in two terms or quarters (T1, T2, T3, T4)

There are four types of terms or quarters and students can mix them as it is shown here.



A full year exchange student must select two engineering terms.
To learn more about the second year structure, visit our page (in French).

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THE ENGINEERING TERM/QUARTER(S)

Quarter options

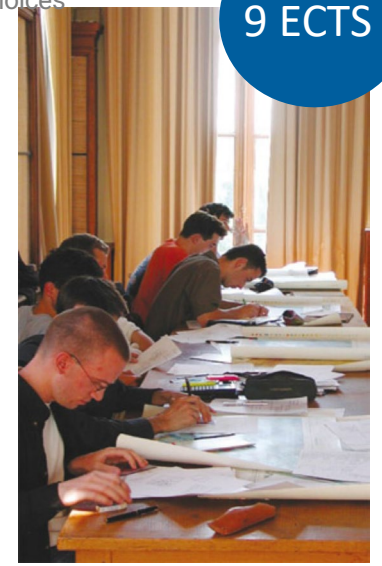
Organized in the form of multidisciplinary courses, tutorials and practical work to be distributed to constitute equivalent to 4 ECTS credits, and a semi-autonomous project sequence equivalent to 5 ECTS credits.
These modules or terms aim to :

- To use knowledge, methods, and tools to realize a system prototype and/or a software(importance is given to concrete realization),

- To acquire working methods and a mastery of the tools and software used by engineers for the design and realization of complex technical systems.

These projects complete the base of scientific and technical knowledge in one or more specific fields of engineering sciences. The skills developed are of a technical nature as well as in the area of cooperation, sharing of expertise and management of constraints. Finally, they allow to clarify the technological choices made in different sectors of activity.

9 ECTS



- **Projects in T1 :**
  - **Projet MECATRO : Mécatronique – DIRENS/CAS**
  - **Projet MOVIE : Mondes VIrtuels : Enjeux, technologies et société – CAOR/GEOSCIENCE**

- **Projects in T2 :**
  - **IDS : Intelligent and Digital Systems – CAOR**
  - **Projet MobApp : Développement d'application web ou mobile – CRI/DSI**

- **Projects in T3 :**
  - **Projet MecAero : Conception et Modélisation en Mécanique des Matériaux et des Structures Aérodynamiques – CEMEF/CDM**
  - **Projet MOLONARI : MOnitoring LOcal des échanges NAppe-RIvière, Industrialisation d'un outil de suivi de la ressource en eau – GEOSCIENCE**

THE ENGINEERING TERM/QUARTER(S)
SPECIALIZED AND OPTIONAL COURSES – T3

Specialized courses are available for students **only during the engineering terms**. They are called « enseignement spécialisés ».Their credits vary between 1 and 2 credits per course. To download the syllabus, click on “4 enseignements spécialisés” on our page.

T3	Information quantique	Physique
	Processus stochastiques avancés	Mathématiques et Systèmes
	Risques naturels	Sciences de la Terre & Environnement
	Procédés Additifs	Mécanique et Matériaux
	Problèmes inverses	Mathématiques et Systèmes

Language courses are also available during engineering term/quarter but the admission may vary according to the level of the student. French as a second language is highly recommended and other languages are available on demand worth 2 ECTS for a whole semester.

PSL Week

In November and March of each year, students are allowed to select one course during the blocked teaching weeks common to the PSL engineering schools : ESPCI, Chimie ParisTech and Mines Paris.

Health And Medicine In Europe - Social, Political, And Ethical Stakes	Economie, Management, Société
City logistics : supply chain & public policies	Economie, Management, Société
Life Cycle of Energy Systems	Energétique et Procédés
Le langage C++	Mathématiques et Systèmes
Extrem Value Modelisation	Mathématiques et Systèmes
Nonlinear Computational Mechanics	Mécanique et Matériaux
Geointelligence for Natural Resources Evaluation and Sustainable Management	Sciences de la Terre & Environnement

ATHENS Week

In November and March oy each year, ParisTech organizes with its partners in the international ATHENS network to organize European teaching weeks: each institution offers courses open to all each institution offers courses open to all students

Sociologie des techniques	Economie, Management, Société
Science de la conception - processus génératifs	Economie, Management, Société
Nouvelles entreprises et Gouvernance Responsable	Economie, Management, Société
Economie de l'énergie	Economie, Management, Société
Sciences Prédictives pour le Génie des Procédés	Energétique et Procédés
Informatique fondamentale	Mathématiques et Systèmes
Large -Scale Machine Learning & Data Mining	Mathématiques et Systèmes
Optimisation combinatoire et stochastique	Mathématiques et Systèmes
Introduction aux nanomatériaux	Mécanique et Matériaux
Géophysique de la subsurface	Sciences de la Terre & Environnement
Calcul des structures	Sciences de la Terre & Environnement
Les valeur de l'art	Sport et Développement Personnel
Couleur, arts, industrie	Sport et Développement Personnel

THE RESEARCH TERM/QUARTER

Quarter options

15 ECTS

This 15 ECTS credit course is designed so that each engineering student can fully integrate into the world of into the world of research for one term and carry out a fundamental or applied research activity by taking advantage of the variety and excellence of Mines Paris's and PSL research centers. This is why the research term has the following objectives:

- to conduct inductive reasoning that combines scientific rigor, the virtue of doubt and the ability to question themselves.
- to understand and take into accountable into account the challenges of research and innovation

This term is only available for students with an advanced level of French (C1) and could be conduct in other location than Paris campus.

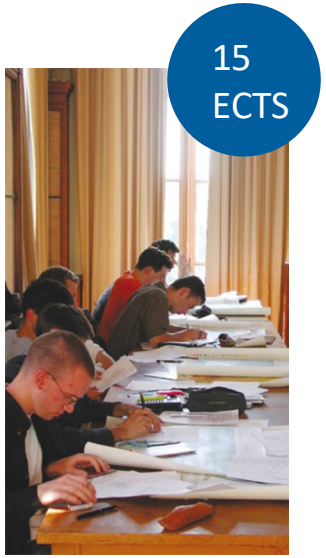
T1	T2	T3
Economie Appliquée	L'ingénieur et la recherche en Santé	Sciences Prédictives pour le Génie des Procédés
Atome Lumière Matière	Efficacité Energétique des Systèmes	Sous-Sol et Transition Energétique
	Transition Energétique	Données, Images, Modèle physique, et Apprentissage
	Milieux Naturels	Analyse des Langages
	Data Sophia	Science Techniques Société
	Théorie du Contrôle	Science de la conception
	Logistique Durable	
	Design de Matériaux pour les Nouveaux Défis	
	Particule Noyaux Univers	
	Fluides	

- See code UE32 on the catalogue for list of available themes during Term 1 and 2
- See code UE42 on the catalogue for list of available themes during Term 3

THE ENTREPRENEURSHIP TERM/QUARTER

Quarter options

- This 15 ECTS pedagogical space aims to give students who choose it skills (identify and seize opportunities for innovation or creation, managing uncertainty, communicating, negotiating, building a team, team building), and knowledge (marketing and innovation and innovation, entrepreneurial finance, construction of business plans, intellectual property) in order to face the situations of start-up creation. To do this, it relies on courses and seminars with entrepreneurial ecosystem, particularly from venture capital and a design studio approach in the entrepreneurial the School's entrepreneurial space with personalized support for each creation project.

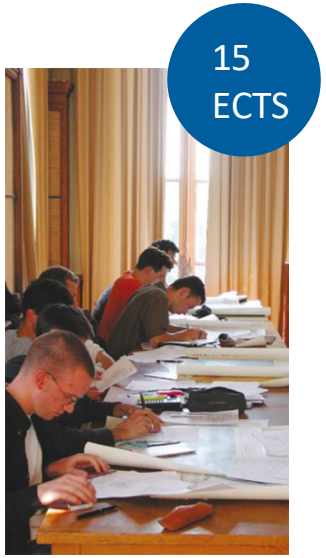


- See code UE32 on the catalogue for list of available subjects during Term 1 and 2. To download the syllabus, visit our page.
- This term is only available for students with an highly advanced level of French (minimum C1).

THE INTERNSHIP TERM/QUARTER

Quarter options T4

- The internship term consists of a professional experience of 3 months that is awarded 15 ECTS after submitting a report.
- The internship term is only available during the Spring semester after a T3 of engineering
- Students will have access to an internship research platform and search on their own the internship. Since it covers half of the Spring semester, we do not recommend students to do an exchange programme only for Spring semester.



ENGLISH PROGRAMMES

Masters PSL

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MASTER IN ENERGY

Structure of Master 1 – FRENCH and ENGLISH

The first year curriculum is organized into two academic semesters based on scientific, humanities and social sciences, language and culture, and project-based activities. A compulsory two-month discovery internship is carried out at the end of the course, at the end of May and beginning of June.

Fall Courses	Language	Hours	ECTS
Equilibrium thermodynamics	English	14	2
Electrochemistry/Corrosion	English	40	4
Process design	English	30	3
Industrial processes modelling	English	30	3
Nuclear Energy	English	30	3
Python programming	English	18	2
Metrology and data science	English	18	2
Litterature review project	English	45	5
PIG (innovation projects)	English	25-30	3
Language (English/French)	Eng/fr	30	3
TOTAL			**30**

Spring Courses	Language	Hours	30
Heat and mass transfer	English	60	6
Fluid mechanics	French	40	4
PIG2	English	30	3
Solids electronic properties	English	40	4
PSLweek	English/French	25	3
Professional insertion (CV, motivation letters…)	English	5	1
Language (English/French)	English/French	25-30	3
Research internship*	English/French	8 weeks	6
TOTAL			**30**

*Students must apply for an internship on their own. We do not recommend coming only for Spring mainly for this reason.

MASTER IN ENERGY

Structure of Master 2 – ENGLISH

The second year curriculum is organized in one academic semester and is based on scientific courses, human and social sciences, languages and cultures and project-based activities. The second semester is devoted to a compulsory 5 to 6 months' end-of-study internship, starting at the end of February - beginning of March.

In the first semester, students must choose two tracks out of the four proposed. Once these choices of tracks are validated, no changes will be possible. Spring semester only is not available.

Fall Semester	ECTS
Core module • Introduction to energy • Energy systems thermodynamic modeling • Refresher courses (Thermodynamics, materials, Fluids mechanics, electrochemistry) • Life Cycle of Energy Systems	6 1 2 1 2
2 tracks* out of 4 among : • Track 1 Energy Efficiency • Track 2 Reducing Carbon Footprint of Energy Systems • Track 3 Renewable Energy Integration • Track 4 Technologies of Renewable Energy Systems	18 9 9 9 9
PSL Week	2
Business Intelligence	2
Language (English/French)	2
TOTAL	**30**

Spring Semester	ECTS
Internship in R&D (20-24 weeks/ 320hours) Either in the industry or in academic lab	**30**

*See detailed tracks on the next slide

MASTER IN ENERGY

Structure of Master 2 – ENGLISH

Each course within a track is worth 3 ECTS.

Track 1 Energy Efficiency	Track 2 Reducing Carbon Footprint of Energy Systems	Track 3 Renewable Energy Integration	Track 4 Technologies of Renewable Energy Systems
T1.1 : High energy-efficient industrial processes	T2.1 : CO_2 Capture and Storage (CCS)	T3.1 : Resources (solar, wind and hydro)	T4.1 : Fuel cells and electrolysis
T1.2 : Energy efficiency of mobility systems	T2.2 : Alternative fuels (H_2, biomass, biogas,..)	T3.2 : Power systems	T4.2 : From photovoltaics to thermoelectricity
T1.3 : Energy efficiency of Urban Systems and Buildings	T2.3 : Utilisation and Valorisation of CO_2 (CCUV)	T3.3 : Storage of REn	T4.3 : Energy conservation and storage (Battery, supercap,…)

MASTER IN MATERIALS SCIENCE AND ENGINEERING

The program includes an M1 year (60 ECTS) and an M2 year (60 ECTS). Some courses are joint courses with the engineering programs of partner institutions. M1 & M2 are totally taught in English.

•M1 with common core + specialization courses at the student's choice + 1 internship (2-3 months)

•M2 with 3 possible tracks to choose from:

- Materials of the future - Design and Engineering (MADI) ;
- Materials science and Engineering in Paris (MAGIS) ; Microfluidics.
- Materials of the future - Design and Engineering (MADI) and Microfluidics can be taken in professional training contract (*contrat de professionalization*).

More information on curriculum here. Students must select one an only track.

Master 2 is available only in Fall and Full Academic Year

GENERAL REQUIREMENTS

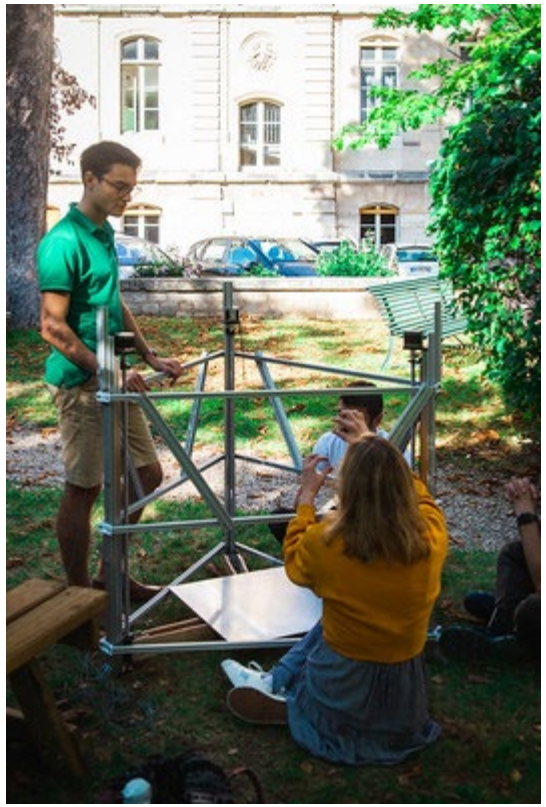
Prerequisites

- **Master's Year 1:** Students must have a Bachelor's degree or a Bachelor of Science degree (Chemistry, Physics, Science and Technology, Mechanics, Engineering Science, etc.). or equivalent
- **Master's Year 2:** Students must have reached the Master 1 level in science.

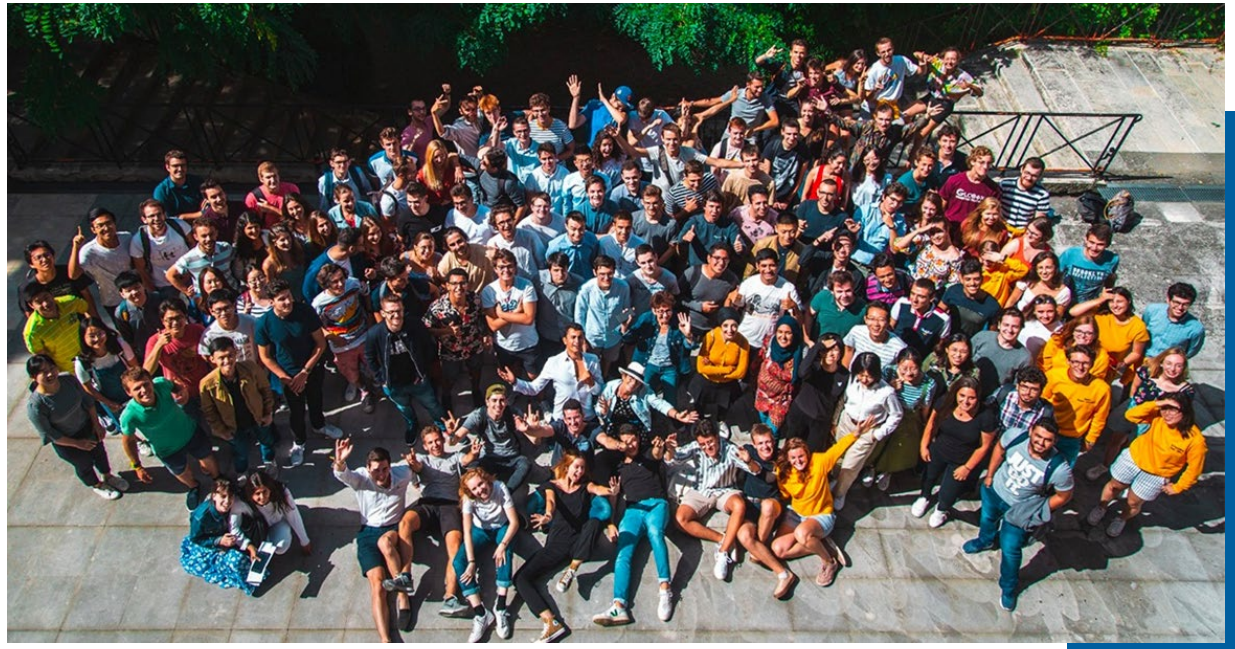
Language requirements

- Programme in French: advanced B1
- Programme in English: B2

The proof of language level can be a certificate from your current university.



CONTACT



For more information, please contact:

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