ENERGY AND SUSTAINABLE DEVELOPMENT IN PARISTECH SCHOOLS

Quinzaine "Les études d'ingénieur en France" - Campus France Colombie
5 March 2021
### GRANDES ÉCOLES & SPECIALTIES

<table>
<thead>
<tr>
<th>Speciality</th>
<th>AgroParisTech</th>
<th>Arts et Métiers</th>
<th>PSL</th>
<th>ESPCI Paris PSL</th>
<th>Université Paris-Saclay</th>
<th>PSL</th>
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</thead>
<tbody>
<tr>
<td>Mathematics &amp; applications</td>
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<td>Information and communication sciences and technologies</td>
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<tr>
<td>Life sciences and engineering</td>
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<tr>
<td>Earth sciences and environmental engineering</td>
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<td>Physics, optics</td>
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<td>Materials science, mechanics and mechanical engineering</td>
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<td>Industrial engineering</td>
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<td>Transport</td>
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<tr>
<td>Economics and social sciences, management, statistics</td>
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</table>
ESPCI Paris-PSL
Institute for Training, Research and Innovation

Highly interdisciplinary research: From Fundamentals to Innovation

2 articles per day
1 patent per week
1 start up per quarter.

Engineering school founded in 1882

School that trains engineers for the sectors of research and development.

90 students per year
Awakening and Animation to Climate Transition
Sustainable development lecture
Track in sustainable development 3A
Research projects in the institute
Awakening and Animation to Climate Transition
Non mandatory lectures

Hackathon  Carbon Audit
Climate fresco
What is a Green Engineer?
Organization of conferences by students on the theme.
Conferences with philosophers and economists from the PSE and the ENS.

Semaine PSL (15h by year)
Semaine Athens (15h by year)
Awakening (30h by year)
Awakening and Animation to Climate Transition

Student associations

PC Réveil
PC Durable
YourPSL

Bicycle repair shop
Household device repair shop
Beehives
SUSTAINABLE DEVELOPMENT Lecture 1A 35H
(mandatory)

The lecture is focused on the DNA of the school: Advanced Materials and Processes
Know the essential principles of sustainable development and the circular economy
Acquire "Life Cycle" thinking and apply it to eco-design
Be aware of chemical and work-related risks; know how to limit and protect yourself from them.

Contents:
Sustainable development, Corporate Social Responsibility (CSR)
Circular economy, Life cycle assessment and eco-design
Life Cycle Assessment, Eco-design, Health-Safety-Environment
General, Chemical risk, Other risks

Tutorials:
Comparative life cycle analysis of two coffee machines (3h)
CLP/FDS/REACH in a biotech start-up (2h)
SUSTAINABLE DEVELOPMENT Lecture 1A 35H
(mandatory)

The lecture is focused on the DNA of the school: Advanced Materials and Processes
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Tutorials:
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CLP/FDS/REACH in a biotech start-up (2h)
Track in sustainable development 3A

Choice of 4 minor courses in Physics Biology Chemistry Biotechnology

**UE Analytical Chemistry**
- Chemometrics
- Bioanalytics, Miniaturization and
- Mass Spectrometry
- Water treatment

**UE Synthetic Chemistry and Applications**
- Polymer Chemistry and Applications
- Synthetic Methods in Molecular Chemistry
- Circular economy of plastics
- Recycling
- Flow chemistry

**UE Inorganic Chemistry for Catalysis and Energy**
- Electrochemistry
- Inorganic Chemistry and Catalysis

**UE Sustainable Energy (Conferences)**
- Blue energy
- Hydrogene
- Nuclear energy
- Wind energy
- Solar energy
- Energy Storage
Blue energy
Harvest the energy of the salt gradient.
CBI, Gulliver
Harvest the energy of waves
PMMH

Polymers
C3M, SIMM
- Circular economy of plastics
- Vitrimers
- Flow chemistry

selection of enzyme for catalysis
CBI
- Microfluidics
- Circular economy of plastic

Water treatment
CBI
- Desalination

Radiative materials for self cooling
Langevin
- Metamaterials
AgroParisTech forward-looking approach is aimed at addressing the main global challenges of the 21st century:

- Feeding the population in a sustainable way
- Protecting natural resources
- Fostering innovation
- Developing the bioeconomy

Sustainable Development is a major topic at AgroParisTech, relating to almost every fields of education and research.

5 Departments of Education and Research:

- Agronomy, Forestry, Water and Environmental Sciences and Technology
- Life Sciences and Health
- Sciences and Engineering for Food and Bioproducts
- Social sciences, Economics and Management
- Modelling: Mathematics, Informatics and Physics

AgroParisTech scientific expertise is structured around four main fields:

- Agricultural production and forestry
- Food and non-food transformations
- Sustainable management of natural resources and the environment
- Human health
Programmes (1): Diplôme d’Ingénieur AgoParisTech

Second year

➢ study tracks:
  ✓ “Environmental engineering and management”
  ✓ “Sustainable production, sectors, and territories”

➢ core-curriculum: engineering sciences and mathematic modelling, economic and social sciences, management

➢ choice of more than 100 course-units: Plan Ecology, Research in Agronomy and Agro-ecology, Biodiversity and Evolution, Environment and Natural Resources Economics, Sustainable Development and Governance, Urban Ecology etc.

➢ Projects: Agricultural development, Forest and Water planning, Biodiversity and Ecosystems Management (pasture and forest), Sector Analysis in Biological Agriculture, Patrimonial Management for Territories etc.

www2.agroparistech.fr

Third year

20 specialties in 10 fields, many of them linked to sustainable development, for instance:

➢ Political Sciences, Ecology and Strategy
➢ Environmental Management of Ecosystems and Tropical Forests
➢ Natural Habitat Management
➢ Environmental Engineering: Water, Waste and Sustainable Planning
➢ Agricultural Development
➢ Sustainable and Innovative Farming Sectors

More information: [http://www2.agroparistech.fr/Cursus-Ingenieur-AgroParisTech-2111.html](http://www2.agroparistech.fr/Cursus-Ingenieur-AgroParisTech-2111.html)

Internships and Job prospects in companies mindful of sustainable development: Veolia, Suez, Danone, l’Oréal etc.
Post-master programmes

Executive Master Programmes such as:
- Forestry, Nature and Society - International Management
- Public Policies and Strategy for the Environment
- Public Action for Sustainable Development of Territories and Agriculture
- Water Management
- Water for All
- Health Food and Environmental Risks Management

PhD: fields covered by AgroParisTech doctoral candidates:
- Agronomic, Forest, Water and Environmental Sciences and Technologies
- Life Sciences and Health, Nutrition, Plant and Animal Sciences
- Science and Engineering for Food and Bio products
- Social, Economic and Management Sciences applied to Agriculture, Food, Health, Forest, Water, Territories, Environment and Sustainable Development
- Mathematics, Informatics and Physics applied to Living Matter and the Environment

Master Programmes such as:
- Agro Sciences, Environment, Territories, Landscapes, Forest (e.g. track Wood, Forest and Sustainable Development)
- Biodiversity, Ecology and Evolution
- Economics of the Environment, Energy and Transport* (e.g. track Sustainable development and environment Economics)
- Sciences and Technologies for Agriculture, Food and Environment (e.g. track Environmental Management of Ecosystems and Tropical Forests)
- Territories and Local Development Management

*Joint programme including Ecole des Ponts ParisTech and MINES ParisTech
Research (1)

In the domain of **sustainable management of natural resources and the environment**, AgroParisTech has a wide range of activities and projects enabling it to measure:

- the environmental impact of agricultural and forestry activities,
- the treatment of water and waste, the quantitative management of water,
- the protection and valorisation of water, forest and soil resources,
- the evaluation of biogeochemical cycles,
- the preservation and maintenance of biodiversity.

The methods used extend from **experimental approaches in the laboratory** or in the field to the search for **high-performance indicators** or **predictive modelling** for risk management.

These themes are studied from an **ecological angle**, in the broad sense of the term, but also making use of **social and economic sciences**.

In a context marked by the acceleration of global changes, the question of the adaptation of species, ecosystems, societies and modes of interaction between human society and the environment has engendered a greater need for theoretical and experimental research in these domains, to help us to understand the processes and multiple interactions involved in the responses of organisms, ecosystems and socio-ecosystems to these global changes.
Research (2)

Research units such as:

- CIRED (International Centre for Research on Environment and Development)
- ÉcoFoG (Ecology of Guiana Forests)
- Public Economics
- ÉCOSYS (Functional Ecology and Ecotoxicology of Agroecosystems)
- ESE (Ecology, Systematics and Evolution)
- G-EAU (Water management, uses and the actors involved)
- SAD-APT (Sciences for the Action and Development – Activities, Products, Territories)
- Silva
- Territories
- Etc.

http://www2.agroparistech.fr/Research-units.html

Research projets such as:


- **ADSORB** - A performing Depollution System for Runoff water preserving Biodiversity (2018-2023 / LIFE project): implement and test a new innovate solution enabling to effectively reduce pollutants in pluvial water which are thrown out in natural habitat.

- **AgriWasteValue** (2018- 2022 / Interreg North-West Europe Programme): transform agricultural residues from the European North-West regions into bioactive compounds in order to use them in key industrial sectors such as the cosmetic and nutraceutical fields and then in a second phase in the energy, chemical and agricultural fields.
ARTS ET MÉTIERS
ARTS ET MÉTIERS PARISTECH

Algunos datos

➢ Creada en 1780 por el Duque DE LA ROCHEFOUCAULT-LIANCOURT « Combinar la habilidad de la mano con la inteligencia del conocimiento»

➢ Formación generalista a dominante en ingenierías mecánica e industrial.

➢ Una sola escuela con 8 Campus y 3 institutos de investigación.

➢ +1100 ingenieros Arts et Métiers (gadzart) graduados cada año.

➢ Una estrategia orientada hacia la industria del futuro.
### OTRAS CIFRAS

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<thead>
<tr>
<th><strong>11</strong></th>
<th><strong>220</strong></th>
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</thead>
<tbody>
<tr>
<td>SITES</td>
<td>DOCTORANTS</td>
<td>BACHELOR</td>
</tr>
<tr>
<td>répartis sur toute la France dédiés à l’enseignement et à la recherche</td>
<td>dans notre École Doctorale « Sciences des Métiers de l’Ingénieur »</td>
<td>DE TECHNOLOGIE</td>
</tr>
</tbody>
</table>

| **6000**   | **15**      | **11**  |
| ÉTUDIANTS  | LABORATOIRES| PROGRAMMES |
| toutes formations confondues | et équipes de recherche | 1 généraliste |
|           |             | D’INGÉNIERIE | 10 en apprentiss |

| **1100**   | **7 MILLIONS** | **+20** |
| PERSONNELS | € de chiffre d’affaires | MASTERS RECHERCHE |
| enseignants, techniques & administratifs | FORMATION CONTINUE |  |
|       |       |       |

| **15 MILLIONS** | **2000** | **17** |
| € de chiffre d’affaires généré par des contrats avec | AUDITEURS | MASTÈRES SPÉCIALISÉS © |
31 UNIDADES DE ESPECIALIDAD: 150 HORAS + 6 MESES DE PASANTIAS

1. Les nouvelles énergies pour un développement durable (Aix-en-Provence) [https://artsetmetiers.fr/fr/les-nouvelles-energies-pour-un-developpement-durable-finrj]

2. Ingénierie des procédés et des matériaux pour le Développement Durable (Bordeaux) [https://artsetmetiers.fr/fr/ingenierie-des-procedes-et-des-materiaux-pour-le-developpement-durable]

3. Motorisations d'avenir, hybridation et piles à combustible (Châlons-en-Champagne) [https://artsetmetiers.fr/fr/MAHPC]

4. Éco-conception de biens et de services (Institut de Chambéry) [https://artsetmetiers.fr/fr/eco-conception-de-biens-et-de-services]

5. Bois : une ressource locale pour la construction durable (Cluny) [https://artsetmetiers.fr/fr/bois-une-ressource/locale-pour-la-construction-durable]

6. Efficacité énergétique pour l'usine du futur (Lille) [https://artsetmetiers.fr/fr/efficacite-energetique-pour-lusine-du-futur]

7. Énergie bas carbone et système énergétique efficient (Paris) [https://artsetmetiers.fr/fr/energie-bas-carbone-et-systeme-energetique-efficient]

2. MR - Énergie électrique pour le développement durable (Lille) https://artsetmetiers.fr/fr/master-energie-electrique-pour-le-developpement-durable-e2d2

1. I2M - Institut de Mécanique et Ingénierie (Bordeaux) [http://i2m.u-bordeaux.fr/](http://i2m.u-bordeaux.fr/)


3. LABOMAP - Laboratoire Bourguignon Matériaux et Procédés (Cluny) [http://labomap.ensam.eu/](http://labomap.ensam.eu/)

4. LCPI - Laboratoire Conception de Produits et Innovation (Paris) [http://lcpi.ensam.eu](http://lcpi.ensam.eu)

5. LIFSE - Laboratoire d’ingénierie des fluides et des systèmes énergétiques (Paris) [https://lifse.artsetmetiers.fr/](https://lifse.artsetmetiers.fr/)
LOS INVESTIGADORES Y ESTUDIANTES TIENEN LA POSIBILIDAD DE TRABAJAR SOBRE EL CICLO DE VIDA COMPLETO DE UN PRODUCTO: DESDE LA CONCEPCIÓN HASTA EL RECICLAJE, PASANDO POR LA PRODUCCION.
LIFSE: RECUPERACIÓN DE RESIDUOS TÉRMICOS $T<250 \, ^\circ C$

Proyecto ERC SYNERGY - Sistema ciclo ORC completo 150 kW (SES36)
CHIMIE PARISTECH - PSL
Fostering Talents for Tomorrow’s Chemistry

Charles Friedel
Founder (1896)

Nobel Prize
Henri Moissan
Former Director (1896)

Eugène Schueller,
Alumni (1909)

Highly selected students (50% of women)
Researchers, Professors & Associate Professors

350

140

20% international students

20% Business, management and human skills

40% Practical training

12 months Mandatory internship

1 Prof for 3 students

training by research
7 pub. per week

L’ORÉAL
Sustainable development and Energy curricula within our degree in engineering

**Year 1**
Basics towards engineering
- Basic courses
- Team projects
- Management, Economy
- Language and Cultures
- **Work internship 1-2 months**

**Year 2**
New applications
- Basic courses & options
- Projects (innovation)
- Management, Economy
- Language
- **Internship - 5 months**

**Year 3**
Specialization
- Projects (entrepreneurship)
- Engineering or Research master
- **Master internship - 6 months**

**Tracks**
- Molecular chemistry
- **Materials**
- Chemical engineering
- Analytical and Biological Chemistry Biotechnologies

**Energies**
- Biotechnologies
  - Sustainable processes, eco conception & recycling
  - Industrial processing
  - Green organic chemistry
  - Cosmetology & Formulation
  - **Energies**
Masters of Science with

- Material Science and engineering
  - Materials and Engineering Sciences in Paris (EN)
  - Materials of the future, Design and Engineering (FR)
  - Microfluidics, fluid science engineering (FR)


- Energy (EN)
  - Sustainable Energy & Materials
  - Energy Efficiency
  - Decarbonation of fuels
  - Renewable Energy, grids

  https://www.psl.eu/en/education/master-s-degree-energy
Materials for Energy: Nanomaterials for Solar Cells

**Perovskite solar cells**
Contact thierry.pauporte@chimieparistech.psl.eu

**Quantum dots solar cells**

**Dye Sensitized Solar Cells**

**Hybrid solar Cells**: new devices to convert the energy of solar light into electricity

**Modelling team**: Contact carlo.adamo@chimieparistech.psl.eu
Energy: Electrochemical Storage

Positive electrode materials lithium
Contact: philippe.barboux@chimieparistech.psl.eu

Slurry systems (redox flow/zinc air)

Recycling

Contact: jolanta.swiatowska@chimieparistech.psl.eu

Negative electrodes / Silicon nanowires
Energy: Hydrogen Technology

High temperature devices (based on Molten Carbonate or/and Solid Oxide electrolyte):

\[ 2\text{H}_2\text{O} + \text{Electricity} \rightarrow 2\text{H}_2 + \text{O}_2 \]

Water vapor electrolyser

- **SOEC, 850°C**
  - \( \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2 \)
  - Operating Pressure
  - Delamination,....

**Optimisation**

- **Lifetime**
- **Performances**

**Fuel cells**

- **SOFC (750°C)**
- **MCFC (600°C)**

New materials, Thin oxide layers, New concepts
Contact: armelle.ringuede@chimieparistech.psl.eu

Modelling team:
Contact carlo.adamo@chimieparistech.psl.eu
Energy: Photovoltaic – IPVF

Founding Members

- EDF
- Total
- CNRS
- Air Liquide
- HORIBA
- RIBER

Ambition

Perform upstream research with a strong industrial foothold and operate a world-class experimental platform to:

- Radically improve the performances of PV cells,
- Give birth to disruptive PV-based technologies.

Scientists

- 150 researchers involved
  - 100 hosted in the new building in Paris-Saclay
  - ~25 directly hired by IPVF

Free space ready to welcome guests scientists & start-ups

R&D facilities

- > 70 state-of-the-art tools, owned and operated by IPVF
  - Analytical
  - Material & Device Process
  - Up-time available for contract research

Contact: jf.guillemoles@cnrs.fr
OUR LINK WITH BUSINESSES
An industrial chair with

• Objective
  – Contribute to the implementation of a circular economy model, respectful of the principles of sustainable development and beneficial to citizens, manufacturers, recycling actors and territories.

• Missions
  – Develop new quality secondary materials
  – Defining new business models for recycling
  – Training the actors of tomorrow
Chimie Paris Innov

our incubator cofunded by the European Union
➢ 700 000€ project
➢ Started in 2018

Augmented Wood, and next generation of Human-to-Machine Interfaces

Plasma catalysis technology for methanation of CO₂
European patent [EP15202925.2] 2015

ENERGO, Ferroscan, LOMA, KOYA...

Contact: michael.tatoulian@chimieparistech.psl.eu
Link with businesses

- Our graduates work in a wide diversity of businesses in Energy and sustainable development

- Some are sponsors of our graduates
ÉCOLE DES PONTS PARISTECH
• A public engineering school recognised for the excellence of its graduate studies

• Founded in 1747

• Ecole des Ponts ParisTech is a school of the Ministry of the Ecological Transition

• Ecole des Ponts ParisTech serves the missions of the French Ministry in the fields of sustainable development, climate, energy transition and biodiversity.

• 65% of research publications directly match with 13 out the 17 Sustainable Development Goals defined by the United Nations

La universidad del desarrollo sostenible
**desarrollo sostenible en la formación en ingeniería**

<table>
<thead>
<tr>
<th>Individualized learning agreements</th>
<th>A common high level of scientific knowledge scientific background mathematics – physics mechanics</th>
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<tbody>
<tr>
<td>6 departments of studies</td>
<td>70 learning outcomes in sustainable development, in all majors</td>
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<tr>
<td>Civil and structural engineering</td>
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<td>• City, environment, transport</td>
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<td>• Mechanical engineering and</td>
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<td>materials</td>
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<tr>
<td>• Applied mathematics and computer</td>
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<tr>
<td>science</td>
<td></td>
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<td>• Industrial engineering</td>
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<td>• Economic science, management,</td>
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<tr>
<td>• Sustainability of Buildings,</td>
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<tr>
<td>Infrastructures, Networks,</td>
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<tr>
<td>Territories, Cities and Mobility</td>
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<tr>
<td>• Digital and Societal Transformation of the Industry</td>
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<tr>
<td>• Corporate and Sustainable</td>
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<tr>
<td>Development Economics and Finance</td>
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<tr>
<td>• Human and Environmental Risks</td>
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</table>

A common set of core courses related to sustainable development
Programas y cursos

- Master in Transport and Sustainable Development
- Master in Energy Transition and Territories
- Master in Management and Engineering of Environmental Services

- Green Finance (1 semester)

Postmasters in:

- Sustainable building and real estate
- Management of Energy Projects
- Energy and Large size projects
- Smart mobility

PhD Ecole des Ponts
Specific focus in public action and sustainable development
Relaciones con industrias

Transportation, environment, urban services

Energy

Industry

Consulting

Construction

Finance
Investigacion para la transicion ecologica y digital

A challenge-based approach to address 4 socio-economic issues of sustainable development

- Industry of the future
- City and mobility systems
- Management of risks, resources and milieus
- Economy, practices and society
Investigación para la transición ecológica y digital

- Ecomaterials
- Digital Manufacturing
- Innovative Structures
- Geomechanics

- Modelisation of uncertainty
- Digital simulation
- Systems optimisation

- Data processing
- 3D vision
- Big data

- Cities of the future
- Infrastructures
- Practices

- Public policies
- Environmental economy
- Markets and governance

- Sustainable development
- Climate change

- Sustainable mobility
- Territorial dynamics

- Urban waters
- Alternative resources

- Atmospheric environment
- Air quality
- Renewable energy

- Hydro-meteorological risks
- Resilient cities

- Physics of atmosphere
- Climate

- Renewable energy
- Natural risks

- Cities of the future
- Infrastructures
- Practices

- Public policies
- Environmental economy
- Markets and governance

- Sustainable development
- Climate change

- Sustainable mobility
- Territorial dynamics

- Urban waters
- Alternative resources

- Atmospheric environment
- Air quality
- Renewable energy
Research for the ecological and digital transition

- **Renewable Energy**

- Onshore and offshore marine energy
- Wind farms and solar energy
- Smart grids
Research for the ecological and digital transition

- Resilient Cities: mobility, water, air.
- Smart & Sustainable Mobility
- Extreme rains
- Air Quality
MINES ParisTech - PSL
MINES PARISTECH EDUCATION AND RESEARCH

1st
University in France for its links with industry

35%
International students

1/3
International teachers

✓ Founded in 1783 and evolving strongly over the centuries
✓ Reporting to the Ministry of Industry and Finance
✓ We are part of Paris Sciences et Lettres Research University
✓ We are founding members of ParisTech.

5 departments
✓ Energy and process engineering
✓ Earth sciences and environment
✓ Mathematics and complex systems
✓ Materials and mechanics
✓ Economy, management and society

18 research labs
□ Energies of the future
□ Transport and mobility
□ New materials
□ Health and environment
□ Innovation and competitiveness
□ Center for Geosciences ….

Figures: 2400 persons
✓ 1,027 permanent staff including 234 research academics
✓ 385 PhD students
✓ 1,163 graduate students
ENERGY & SUSTAINABLE DEVELOPMENT

OUR TRAINING

Cycle ingénieur – Engineering cycle

- Strong background in fundamental courses,
  - Mathematics, physics, mechanics ...
- with a multidisciplinary approach:
  - Social sciences, Languages, Sports, Economics and Management
- and the possibility to customize your curriculum with 17 fields of specialization:
  - Earth and Environmental Sciences
  - Machines and energy
  - Nuclear energy and risk
  - Geosciences (GESOCIESCES) and Geostatistics and applied probabilities
  - Processes and Energy (P&E)

ISUPFERE

- Engineer apprenticeship cycle
  - Open to people under 26, holding a BAC + 2 diploma.
  - 3 years program based on a strong interaction between training at school and in business
- Aim of the program
  Train engineers capable of designing, installing, operating and maintaining energy installations including renewable energies in the building and industrial sectors.

Master in Energy

- Two years programs
- Tracks
- Set up within University PSL
ENERGY & SUSTAINABLE DEVELOPMENT

OUR TRAINING

Advanced Master programs

MS ENR : Renewable energy
MS GAZ: Gas engineering and management
MS ALEF : International Energy Management
MS ENVIM: International Environmental Management
✓ ENVIM Europe
✓ ENVIM International
✓ ENVIM Asia

Phd – doctoral studies

Energy and processes
Engineering geology
Geostatistics
Hydrology and quantitative hydrogeology
Techniques and economics of underground mining

ParisTech training collaborations

Masters in collaboration with other ParisTech Schools:
TRADD: Transport and sustainable development
MVE: Mobility and electric vehicles

Student/prof ratio
9 to 21 months in internship
800 lecturers from corporate world

800 lecturers from corporate world
Energy and process engineering

The climate is the main subject, they work on energy systems (in the broad sense, from component to energy networks).

Research centers

Research centers and groups
- Centre for Energy Efficiency of Systems (CES)
- Centre Thermodynamics of Processes (CTP)
- Observation, Impact, Energy Center (O.I.E.)
- Centre for Processes, Renewable Energies and Energy Systems (PERSEE)

Our research topics

- Thermodynamic properties of fluids for machines and industry Efficiency of energy systems
- CO2 capture Integration of renewable energies into the networks
- Energy transport and storage
- Biogas
- Hydrogen
- Circular economy: transition to an industrial eco-park
Earth Sciences and Environment

Research centers

Research centers and groups
Centre for Geosciences (GEOSCIENCES)
Higher Institute for Environmental Engineering and Management (ISIGE)

117 faculty members

Research topics

Geosciences intends to provide the necessary knowledge on the major issues relating to the management of natural resources, the role that the subsoil can play in the energy transition, environmental protection and sustainable development.

✓ supply of primary resources,
✓ anthropization (underground storage, polluted environments)
✓ impact of climate change (water resources, natural risks).

ISIGE is dedicated to the environment and Sustainable Development. Its ambition is to be a driving force behind the ecological transition and to promote demanding environmental innovation.

✓ Territorial and social ecology
✓ Governance of transitions
✓ LCA and industrial ecosystems
✓ Learning transitions
ENERGY & SUSTAINABLE DEVELOPMENT

OUR LINKS WITH INDUSTRY

Our industrial partners

- EDF
- ENGIE
- AREVA
- Total
- Dalkia

- VINCI
- Veolia Environnement
- Suez
- Egis

- Safran
- PSA Peugeot Citroën
- Renault

- Air Liquide
- Thales
- SNCF

- Nestlé
- Schneider Electric
- LafargeHolcim

- OCP
- Valeo
- Alstom
ENERGY & SUSTAINABLE DEVELOPMENT

OUR LINKS WITH INDUSTRY

Industrial chairs

Energy and processes
Eco-design of buildings and infrastructures (CES) - 3rd edition
New energy strategies (completed)
CO2 capture, transport and storage (completed)

Mathematics and systems
Urban Logistics Chair (CAOR) - 2nd edition
Prospective modeling for sustainable development (CMA) - 2nd edition
Automated driving - Drive for all (CAOR)

Economy, management and society
OCP - Economics of Commodities (CERNA) - 2nd edition
Urban Mines (CGS) - 2nd edition
Gas economy (CERNA)

Geosciences
ANR ISR-U Chair Uranium mining by in situ recovery (Geosciences)
Mineral Industry and Territories Chair (Geosciences)
MINAUMET Chair (Geosciences)
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