



### **ÉCOLE DES PONTS PARISTECH** Building the worlds of tomorrow

July 2023



- **1.** What is Ecole des Ponts ParisTech ?
- 2. Double degree mobilities at Ecole des Ponts ParisTech
- **3.** Application procedure
- 4. Non-degree mobility at Ecole des Ponts ParisTech



## What is Ecole des Ponts ParisTech ?

- A world-class Higher Education and Research Institution
  - Top 300 worldwide in 2023
  - Top 5 in France en 2022



### A world-class Higher Education and Research Institution

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WORLD UNIVERSITY RANKINGS	WORLD UNIVERSITY RANKINGS		ĽUSINENOUVELLE
QS 2023	THE 2023	L'Etudiant 2022	Usine Nouvelle 2022
#174 worldwide #6 France ▲71 vs 2022	#251-300 worldwide #1 France < 5000 students	#4 France	#4 France



### What is Ecole des Ponts ParisTech ?

- A world-class Higher Education and Research Institution
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- A public engineering school dedicated to the ecological transition :
  - Reporting Ministry : Ministry for the Ecological Transition
  - And the Ministry for Higher Education, Research and Innovation.



ParisTech

### The School of the Ecological Transition

- Governing Ministry's name : from **Sustainable Development** (2007-2017) to **Ecological Transition** (after 2017)
- A history of **combining engineering and social sciences** for effective, relevant and appropriate technologies
- 12 Research centers covering 11/17 Sustainable Development Goals (United Nations)
- One « European Research Institute » : Energy for Climate
- **Develop'Ponts :** the student union committed to sustainable development, solidarity actions, **inclusion for the society and the environment**
- **10/14 industrial chairs,** addressing the ecological transition: **3** in sustainable development, **2** in environment, **5** in sustainable transport and mobility





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- A school with a long and prestigious history
  - Creation in 1747 by King Louis XV
  - Nobel prizes and renowned scientists



### A long and prestigious history

#### Among the oldest schools of engineering in Europe

- 1747: École nationale des ponts et chaussées (ENPC) founded by King Louis XV
- 1851: First research laboratory
- 1988: 1st Double Degree agreement with international universities
- 1997: Relocation in Marne-la-Vallée, Green City Campus
- 2021: Founding member of EELISA European University



Henri Becquerel 1852-1908 -Physicist-Nobel prize 1903



Claude-Louis-Marie-Henri Navier 1785-1836 -Engineer, scientist-Inventor of general theory of elasticity



Augustin Cauchy 1789-1857 -Mathematician-One of the founders of modern analysis



Jean Résal 1854-1919 -Engineer-Builder of the pont Mirabeau and pont Alexandre III in Paris



Eugène Freyssinet 1879-1962 -Engineer, entrepreneur-The father of prestressed concrete



Jean Tirole 1953-... -Economist-Nobel prize 2014



Louis Ménard 1931-1978 -Engineer-Developer of the pressiometer



Louis Joseph Vicat 1786-1861 -Engineer-Inventor of concrete



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- A unique combination of fundamental and applied sciences to transform business and society :
  - Flexible and interdisciplinary engineering curriculum
  - leading to top level positions in governments or companies

### Alumni in industry and government

École des Ponts



Elisabeth Borne Ponts 86 Prime Minister



Benoit de Ruffray Ponts 93 CEO Eiffage



Diane D'Arras Ponts 77 Europe Delegate for Water, President IWA



Estelle Brachlianoff Ponts 2018 DG Véolia



Antoine Frérot Ponts 82 CEO Véolia Environnement



MostafaTerrab Pont 79 CEO OCP Group



Christelle Heydemann Ponts 97 CEO Orange



François Bertière Ponts 74 Former CEO Bouygues Immobilier



### Remarkable works, designed by Ecole des Ponts ParisTech Alumni



Viaduc Millau - Michel Virlogeux



Gardens by the Bay (Singapore) © Atelier one – passage project



Beijing Opera - Paul Andreu



Cristo Redentor - Albert Caquot



### **Careers and placement**

#### AVERAGE SALARY IN FIRST JOB €46,900 €52,500 with bonuses





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- A School with an international outlook





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  - leading to top level positions in governments or companies
- A School with an international outlook
- A school with close links with industries





### The Research at Ecole des Ponts ParisTech – 4 issues

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





### The Research at Ecole des Ponts ParisTech – 12 labs



More information on : <u>https://ecoledesponts.fr/en/laboratories</u>



## The Co-Innovation Lab

**Collaborative platforms improving transfer to industry** 



**Fresnel** : multi-scale observation and modelling platform for resilient cities *X-band dual polarisation weather radar, lidars, disdrometer...* 

**Build'In** : building systems and artificial intelligence, materials and structures optimisation, industrial processes

Robotic hall, large-scale additive manufacturing unit, concrete and composite materials modelling

Mμ : urban mobility modelling, new behaviors, infrastructures and urban planning, impact of public policies Softwares, traffic simulators...



### Maker space | d.school



### Makerspace

- 3D Printing,
- Laser cut
- 4 poles (ceramic, wood, steel, water, electronics)

### **d.School Paris**

Design Thinking as an approach to innovation and its management





- innovate - collaborate - share -



### Key facts and figures

### **Students :**

- 950 students in the MSc in engineering / Diplôme d'ingénieur
- 190 in Master's programmes
- 300 in Advanced Master's programmes
- 650 PhD candidates and postdocs
- 410 in Business Administration programmes

i.e. a total of: 2 000 students, 31% female

45% international students, 45 nationalities

**1 250** instructors (academics, researchers, business practitioners)

12 research laboratories6 labs of excellence

480 permanent scientists

**14** education and research chairs

**1000** rank A publications, including 45% with a foreign partner



### **Ecole des Ponts ParisTech and Brazil**

- Academic partnerships, and Research cooperation
  - Long standing relations with top Universities



- Brazilian students are #1 international students : 10 to 20 / year
- About 250 alumni living and working in Brasil



Encontro Ponts-Brasil -2014



"Brasil na Ponts" -2014/2015



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### French Higher Education system for Engineering studies



At the end of the process, you get 2 diplomas :

- Degree of your home university
- Diplôme d'Ingénieur de l'Ecole des Ponts ParisTech



# **Academics: Departments of studies**

#### • Civil and Structural Engineering

Complex projects, site work organisation, innovation of new materials and construction technologies

#### • City, Environment, Transportation

Planification of complex urban systems and operation of urban services (transportation, water,...)

#### • Mechanical Engineering and Material Science:

Research and design of new products and materials in the fields of energy or transportation

### Industrial Engineering:

Innovation and supply chain

#### • Economics, Management, Finance:

Financial engineers : financial engineering, project finance, public/private partnerships Economist engineers : urban, environment, transportation, construction and economic regulation

#### • Applied Mathematics and Computer Science:

Modelisation of complex systems ; analysis of financial, industrial or natural risks ; challenges presented by big data and artificial intelligence

### More information : <u>https://ecoledesponts.fr/en/academic-departments</u>





### Your studies at École des Ponts ParisTech Double degree mobility

### □ 2 year studies leading to the MSc in Engineering (Diplôme d'Ingénieur)

- Year 1 (Senior Bachelor level) : common core transition year
- Years 2 & 3 (Master level) :
- ✓ Common core courses : management, statistics & data analysis, law, language, sport ...
- ✓ Specialization in one of our 6 academic departments
- Choice of tracks in each department
  - ✓ Mix of mandatory courses and elective courses which can be chosen in another department
  - ✓ 5 opening weeks including a 1 week study trip
  - ✓ Year 3 : possibility to choose research-oriented courses in partner programs
- 27 week internship as a minimum
  - End of Y1 : 4 weeks minimum



Between Y2 & Y3 : short internship (10 weeks mini) or long internship (43 weeks mini)

p.26

• Y3 – Semester 2 : End-of-study project (17 weeks minimum)

Intern<sup>al</sup> students





# Mobilities EP USP to ENPC : 5 departments

- Civil and Structural Engineering (GCC)
- Industrial Engineering (GI)
- City Environment Transportation (VET)
- Mechanical Engineering and Materials Sciences (GMM)
- Applied Mathematics and Computer Science (IMI)
- Economics Management Finance (SEGF)





# **Civil and Structural Engineering**

#### Fundamentals of the programme

- Theoretical bases of mechanics and dynamics, applied to structures, soils and fluids
- In-depth teaching in **geotechnics**, **structures or energy issues**, mixing theoretical courses and projects
- 2 long projects : building, bridge, port, road or dam ;
- Several specific courses covering all the aspects of civil engineering and construction to be chosen among a large variety of courses : advanced dynamics, physics of fire, special-risk structures, steel construction, wooden contruction, management of construction projects ...
- Department trip : introduction to geology and construction materials
- New : tracks in common with our City Environment Transportation department
  - Transport and infrastructure
  - Urban planning and infrastructure
- Close links with Navier, in charge of several chairs :
  - Maintenance of Road structures (Sanef Abertis)
  - Sciences for rail transportation (Getlink)
  - Science of Materials for Sustainable Construction (Lafarge Holcim)

#### Job opportunities

ConstructionPublicStructuresGeoteStructures for EnergyMarine

Public works Geotechnics Marine Engineering





# **Industrial Engineering**

#### **OBJECTIVES AND STRENGTHS OF THE PROGRAMME**

- Training engineers and future managers capable of **designing new industrial models and supporting** the industry mutations : ecological and digital transformation, new technologies (Big data, IA, IoT, additive fabrication ...), increased competition ...
- Close links with companies : Chair in Supply Chain (Casino, Louis Vuitton, Michelin, Renault), company • projects ...
- Programme focusing on the design, improvement and optimization of complex industrial systems with an emphasis set on :
  - Planning and modeling of production systems
    Software development
    Design thinking

Tools for modeling and simulation

- Operative research
- Supply Chain Mgt

#### 2 tracks in 2A :

- Engineering of **Design and Innovation**
- Engineering of **Operations and Optimization**

- Great variety of positions :
  - Supply chain manager
  - Production manager
  - Expert in operative research

- Product manager (in design)
- Data analyst Manager of a BU
- Many economic sectors : luxury, automotive, aviation, cosmetics, energy, telecommunication, agri-business, construction, .... + Consulting





# **City Environment Transportation**

#### **OBJECTIVES AND STRENGTHS OF THE PROGRAMME**

- Training engineers capable of **designing and carrying out the challenges that cities face, in relation with climate change :** optimization of current solutions, development of new infrastructures compatible with the transition and massification of the most efficient solutions
- Application of strong skills in mathematics and modeling to the main challenges faced by cities
- Programme focusing on **field work** on issues like : land artificialisation, housing, transport engineering hydrology ....
- Strong links with laboratories (LEESU, LVMT, LHSV, HM&CO, LATTS ...) on issues like :
  - Water management in urban areas
    - Renewable energy
  - Sustainable mobility Resilient cities

#### <u> 3 tracks :</u>

- Urban planning : territorial analysis, economics, city and regional planning ...
- Environment : hydrology, energy, environmental risks, air quality ...
- Transportation : transportation systems, traffic engineering, economics, ...

- Great variety of positions in public and private sector :
  - Infrastructure operators : roads & highway, waste management, water ...
  - Consultancy in environment, transportation & urban planning
  - Government or local authorities
  - Research





# Mechanical Engineering and Materials Science

### **OBJECTIVES AND STRENGTHS OF THE PROGRAMME**

- Solid command of concepts and tools of materials mechanics
- Pedagogical approach giving priority to workgroup and learning though action
- Close links with the industry : Chair **Sustainability of Materials and Structures for Energy** (EDF), close contacts with engineers, ...
- Close links with the Research

### 2 tracks in 2A :

- Design of Industrial systems track
- Modeling track

- Research, development and design of new materials
- Product manager or Manager of industrial programme
  - Example : Manager of a programme aimed at developing a new vehicle





### Applied Mathematics and Computer Science

#### **OBJECTIVES AND STRENGTHS OF THE PROGRAMME**

- Training engineers with a strong command of complex mathematical tools, in order to innovate in cutting edge sectors
- Strong links with experts, managers and researchers in finance, big data logistics or modeling.
- Strong links with laboratories (CERMICS, LIGM) on issues like :
  - Big data Data processing 3D vision
  - Digital simulation Systems optimization Modelisation of uncertainty

4 tracks :

- Modeling : programming and algorythmics, stochastic processes, optimization, finite elements ...
- Optimization : Operational reseearch, game theory, ...
- Vision & Learning : software design and dvt, deep learning, machine learning, image processing ...
- Probability and finance : stochastic calculs and finance, optimization, large dimension statistics ...

- Great variety of sectors :
  - Banking sector : quantitative analisis, risk analisis, trading ...
  - Research and Development in industries
  - High tech programs in industry
  - Scientific computation service providers
  - Engineering sectors dealing with optimization
  - Public research





### Your studies at École des Ponts ParisTech Double degree mobility



(1) AMMS : Multiscale Approaches for Materials and Structures; MSROE : Mechanics of Soils, Rocks and Structures in their Environment; SMCD : Materials Science for Sustainable Construction



### Master's programmes

#### **Applied Mathematics**

- Probabilities and random models (PMA)
- Mathematics of finance and data (MFD)
- Mathematics, Vision, Learning (MVA)
- Modelling, Analysis, Simulation (MAS)
- Operational Research (RO)

#### **Quantitative Economics**

- Analysis and Political Economy (APE)
- Public Policies and Development (PPD)

#### **Energy option**

- Decommissioning and Waste Management (DWM)
  - Energy Transition and Territories (TET)

#### **Mechanical Engineering**

- Multiscale Analysis for Materials and Structures (AMMS)
- Durability of materials and structures (DMS)

#### **Civil Engineering**

 Mechanics of Soils, Rocks, and Structures in their Environment (MSROE)

#### **Materials Science and Engineering**



 Materials science for sustainable construction (SMCD)

#### **Transportation, Mobility, Networks**

- Transport & Mobility (TM)
- Transport and Sustainable Development

#### Environmental, Energy, and **Transportation Economics**

- Environmental Economics
- Energy Economics
- Forward Modelling

#### More information : https://ecoledesponts.fr/en/masters-programs

# **Professional experience**

École des Ponts ParisTech

#### Internship :

- Between 2A and 3A
  - ✓ May be short (10 weeks) or long (43 weeks)
  - ✓ If short : degree in 2 years If long : degree in 3 years
  - $\checkmark$  In a company or in a lab
  - ✓ In France or abroad If in France, compulsory payment to trainees
  - ✓ Prior validation by your department at ENPC
- Support given to students
  - ✓ Workshops on CV and motivation letters
  - ✓ Preparation to interviews
  - Many opportunities to meet companies
  - ✓ Buddy programme with an alumni

### • End-of-study Project (PFE) :

- Last part of your mobility at Ecole des Ponts ParisTech
- Mission in a company or in a lab
- Theme to be chosen with your department at ENPC
- Follow-up by a project director at ENPC
- Master's thesis and defence
- Some example of companies receiving students in a PFE
  - Colas, Bouygues, Razel Bec, SETEC, BIEP, Méridiam
  - Chanel, Estée Lauder
  - SNCF, Ingerop, RATP, Cegelec



### **Experiences abroad**

- The 3 course semesters are at Ecole des Ponts ParisTech
- What can you do abroad ?
  - Internship and/or PFE : preferably outside your home country
  - ATHENS week :
    - ✓ 1 course week in a top level engineering school in Europe
    - ✓ During 2A and/or 3A, depending on the department
    - ✓ Germany, Austria, Belgium, Spain, Hungary, Italy, the Netherlands, Poland, Portugal, Czech Republic, Romania, Turkey
    - ✓ More information : <u>http://athensnetwork.eu/index.html</u>
  - EELISA activities :
    - EELISA : a European University 10 members (France, Germany, Spain, Italy, Hungary, Romania, Turkey, Switzerland)
    - ✓ Possibility of academic activities at an EELISA partner
    - ✓ Example : 30 students from GCC went to Spain for a whole week



### Your graduation at Ecole des Ponts ParisTech

- 3 course semesters + 1 internship + 1 end-of-study project
- Studying abroad not compulsory
- 120 ECTS necesary to get ENPC diploma, of which :
  - 74 ECTS : scientific courses
  - 12 ECTS : language
  - 1 ECTS : sport
  - 2,5 ECTS : internship
  - 0,5 ECTS : profesional orientation
  - 30 ECTS : end-of-study project

(1 Brazilian credit = 1,5 ECTS)

- Within academic departments :
  - Common courses : management, statistics, law, human sciences
  - Compulsory courses of the department
  - Elective courses of the department
  - Opening weeks
  - B2 in French and English compulsory



# « Diplôme d'ingénieur » (MSc in engineering) - Brazilian students

#### Bachelor cycle : At home institution

Master cycle : At Ecole des Ponts ParisTech

- Choice of a Department of studies
- Industrial internship : 10 weeks or 43 weeks
- Project / Master thesis : 17 weeks
- > 120 ECTS credits
- B2 in French and English



Human-sized classes 30% international 25 nationalities

S1 to S7	Master courses	Internship	Master courses	Final project / Master thesis	S10
Home university in Brazil	Ecole des Ponts ParisTech	FR, WW or BR	Ecole des Ponts ParisTech	FR, WW or BR	Home university in Brazil



### Double-degree curriculum for Brazilian students





### The Student's Union (Bureau des Elèves – BDE)

### Object

- An association run by elected students
- Organizing events for students
- Organizing the students' life
- Spokesperson of students to the administration

### Activities

- Clubs : sports, culture, gastronomy, solidarity, arts, ...
- Events, trips, parties ...
- Links with companies : meeting with companies, Junior Entreprise
- BDE and international students
  - Existence of an « international section »
  - Buddy program, in relation with Inter'Ponts

More information on <a href="https://bde.enpc.org/">https://bde.enpc.org/</a>



# An entrepreneurial ecosystem for students

- Entrepreneurship courses
- 2 incubators (Descartes, Station F), 1 accelerator
- Annual Hackathon: « One night to launch a startup »
- Access to research equipment and mentorship
- Special awards, and seed-funds from Fondation des Ponts





Successful start-ups



Roof mounted small wind turbine





### Campus Cité Descartes Greater Paris green cluster



- 20' from Paris center (direct urban train)
- Housing (on campus or in Paris center)
- Sport facilities
- Vibrant campus life
- 15 student societies
- International students welcome desk with « Feel Français »

f e e l français ∡∽





### Alumni endowment and support



**Fondation des Ponts** 

- 22 000 alumni worldwide, holding leadership positions in 100 countries
- 14 international groups
- Bespoke mentoring for international students over their stay in France
- Support for careers and internships
- Special scholarships program for international students
- Corporate Scholarship (Meridiam)
- Excellence awards
- A powerful network of donors

# Financial and practical issues

#### École des Ponts ParisTech

#### Financial issues :

- Tuition fee waiving at ENPC
- Specific tax for ENPC : 1000 €/year (2023-2024)
- CVEC (Governmental tax) : 100 €/year (2023-2024)
- Living cost in/near Paris : 800 to 1 000 €/month as a minimum For more information : <u>https://www.campusfrance.org/es/preparar-presupuesto-estudiante-Francia</u>
- Scholarships :
  - Scholarships in Brazil
  - Eiffel scholarship
  - Fondation des Ponts scholarship
  - Meridiam scholarship
  - Scholarship based on social criterias granted by Ecole des Ponts ParisTech

#### **Practical life :**

- Accommodation : offered in a student's residence 2' away from the school :
  - Individual or shared housing
  - 400 to 650 €/months, with a 150 € Government allowance
  - Only for your first year at Ecole des Ponts ParisTech
- Support by an experienced partner for administrative procedures :
  - Visa and renewal
  - Registration to the French Social Security Scheme
  - Insurances, bank account, transportation card ...



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# When and how to apply ?

### Calendar issues :

- **Application :** after completion of Semester 5
- Mobility : after completion of Semester 7 (if successful application)

### **Step 1 : Preselection by your university**

### **Prerequisites**

- Successful completion of the first 7 semesters @ EP USP
  - Engenharia civil Engenharia ambiental Engenharia Mecanica e Engenharia de Producao
- Average in scientific courses > 75/100
- Ranking : among the top 20% students of your class
- Excellent level in mathematics
- Proficiency in courses that are significant in the domain you apply for
- Language :
  - A2 in French and B1 in English are required by early June 2024, not at the time of your application



### When and how to apply ?

- Step 2 : Nomination by your home university before September 24<sup>th</sup>
- **Step 3 : Application** on Ecole des Ponts ParisTech platform
  - Open from September 1<sup>st</sup> to 30<sup>th</sup>
  - <u>https://crm.enpc.fr/community/enpc/custom\_forms/184</u>
- Step 4 : Online interview in October
  - In English or in French, depending on you
  - Objective : assessing your motivation, and the consistency of the mobility project with you professional or study program
- Step 5 : Admission (*Mid November*)



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# Looking for a non degree mobility ?

Principles of a non degree mobility :

- 1 or 2 semester mobility
- No Ecole des Ponts ParisTech diploma at the end of the mobility
- **Recognition of your grades** by your home university (to be confirmed)
- 2 programs taught in English available @ Ecole des Ponts ParisTech

#### When and how to apply :

- 2 sessions : **September** (spring semester) **and March** (Fall semester or full year)
- Step 1 : Nomination by your home university before September 24<sup>th</sup> or March 24<sup>th</sup>
- Step 2 : Application on Ecole des Ponts ParisTech platform
  - Open from September or March 1<sup>st</sup> to 31<sup>st</sup>
  - <u>https://crm.enpc.fr/community/enpc/custom\_forms/184</u>
- Step 3 : Online interview in October or April
- Step 4 : Admission Mid November or mid May



# Mobilities EP USP to ENPC : 5 departments

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Exchange mobility :

3 students max per year





# Non-Degree English-taught Programmes



Level	Торіс	Academic program	Specifics
Bachelor-senior students	Applied Mathematics	Mathematical tools for engineer Analysis and scientific computing Optimization Probability Introduction to programming Statistical physics Operational research and optimization Statistics & data analytics Language (French) Sport Project within lab	Bespoke academic supervision and small class teaching Full Ecole des Ponts ParisTech student and research experience
Graduate students	Sustainable and Green Finance	Physics of climate change Energy economics ESG analysis Green financing Conferences Credit Risk Management of Climate Risks Project Finance Life Cycle Analysis Capstone Projects	Bespoke academic supervision and small class teaching Full Ecole des Ponts ParisTech student and research experience



Useful links : ecoledesponts.fr/en www.campusfrance.org/es

### **Contact @ Ecole des Ponts ParisTech :** Marie-Christine BERT :

Director of International Relations and Company Partnerships Marie-christine.bert@enpc.fr

**Emmanuel SIMANTOV :** 

Head of International Mobility

Emmanuel.simantov@enpc.fr





### www.enpc.fr/en

**ÉCOLE DES PONTS PARISTECH** Building the worlds of tomorrow