

**Recommendations for Admission to the « diplôme d'ingénieur »
Industrial Engineering Department
International double-degree partners**

The engineering programme at École des Ponts ParisTech prepares each student to become a real player in sustainable development and planning in all its dimensions. Engineers graduating from École des Ponts ParisTech are recognised by companies for their strong scientific skills combined with a capacity for practical implementation of knowledge and projects.

Engineering education at École des Ponts ParisTech leads to the development of skills in four dimensions:

- Advanced scientific and technical education: understanding and implementing conceptual, mathematical or numerical modelling approaches while knowing how to critically evaluate the results of a model is one of the foundations of the engineering profession that the School's training enables students to master.
- Project-based and on-the-job training: from the very first year, numerous collective or individual projects are developed, increasingly close to real engineering projects. For students entering the first year, four internships in laboratories and companies will punctuate the curriculum.
- Managerial, human and social skills: integrated from the first year, the human and social sciences give students an understanding of the world and the ability to take into account the problems of society. A solid knowledge of the business world is developed through courses, internships and projects.
- The ability to work in a team and to work internationally: 20% of teaching time is devoted to languages. International stays and contact with many foreign students enable engineering students to learn to work in a multicultural context.

In the context of admissions of international students from partner institutions, it should be specified that :

- The engineering degree from Ecole des Ponts ParisTech is a general engineering degree with prerequisites common to all teaching departments in the School's core disciplines: Mathematics (Optimisation, Probability, Analysis and Scientific Computing), Continuous and Solid Mechanics, Quantum Physics and Statistics, Programming, Human and Social Sciences.
- The vast majority of courses in engineering training are in French. A B1 level in French is therefore required to be proven by a certificate (TEF, TCF, DELF, DALF).
- A TOEIC score of at least 785 points (or an equivalent international test, such as TOEFL, IELTS or Cambridge Proficiency, CAE or FCE) is required in order to obtain an engineering degree from Ecole des Ponts ParisTech at the end of the course. For this reason, a B1 level in English is required for admission, to be proven by a certificate (IELTS, TOEFL, TOEIC, CAMBRIDGE).

In addition, each department of engineering education has specific prerequisites:

Industrial Engineering Department

Programming

Object oriented language (C++): efficient use of the programming environment and its tools, code documentation, code factorization, conciseness...

Algorithms and data structures

Notions on the complexity of algorithms. Data structures adapted to a given algorithm. Considerations of memory and computation time efficiency.

Optimization

- Kuhn and Tucker conditions: general case, and weak duality; convex case, and strong duality
- Algorithms for convex optimization
- Linear optimization
- Simplex algorithm
- Strong duality and fully uni-modular matrices

Linear algebra

Probabilities

- Fundamental notions (probability space, random variable, law, expectation, ...)
- Usual laws with real and integer values
- Concepts of convergence
- Strong Law of Large Numbers
- Central Limit Theorem
- Main algorithms for simulating random variables
- Monte-Carlo method