MASTER'S
DEGREE IN
ACTION

ESPCI PARIS | PSL

LIFE CYCLE ASSESSMENT & INDUSTRIAL EMISSION REDUCTION TRAJECTORIES

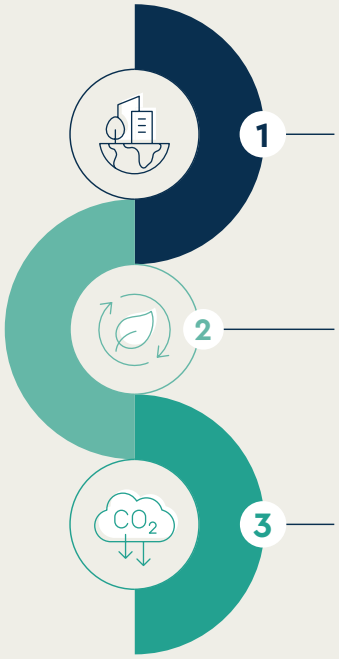
ACCREDITATION BY THE CONFÉRENCE DES GRANDES ÉCOLES IS IN PROGRESS.

The specialized master's degree, ACTION (Life Cycle Assessment and Industrial Emission Reduction Trajectories), at ESPCI Paris – PSL, focuses on training engineers capable of independently carrying out a complete life cycle analysis (environmental, economic, social). The program also emphasizes proposing pathways for industrial decarbonization, leveraging scientific and technical skills.

At the end of the training, students are able to establish a complete LCA covering environmental, economic and social aspects, allowing them to measure the ecological impacts of products and technical systems. Equipped with practical skills and proficiency in the methodologies and tools required for conducting LCA, they will be able to analyze the LCAs produced by others critically. Familiar with the most common applications of LCA in industry and government, they will be capable of identifying the main strengths and weaknesses of LCA and proposing improvements. They are also trained in industrial decarbonization technologies: digital twins, process electrifications, waste recovery, new renewable energies, hydrogen, low-tech technology, CO_2 capture, use and recovery, polymer and metal recycling, eco-design. Mastering these technologies will enable them to propose solid trajectories for the decarbonization of industry.

MASTER'S DEGREE STRUCTURED **INTO 3 MAIN AXES**

These three axes allow students to acquire complete expertise and practical skills, preparing them to meet current and future environmental challenges and to propose solutions adapted to the challenges of the energy and ecological transition.



In-depth understanding of the Anthropocene.

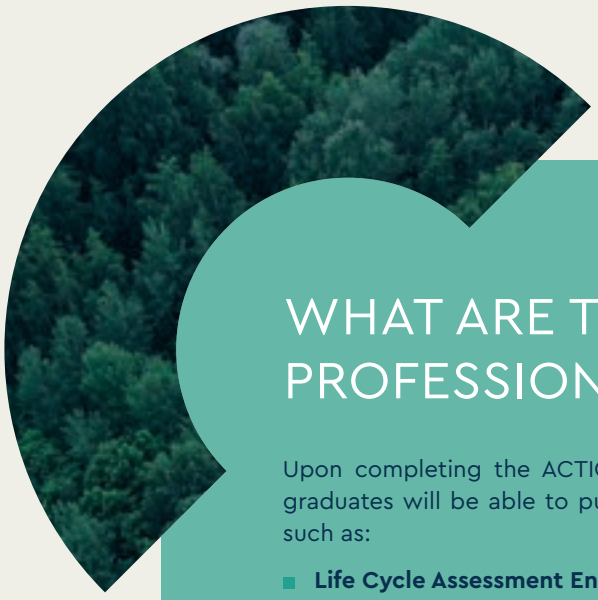
Proficiency in LCA across environmental, economic and social dimensions, and its implementation.

Expertise in essential low-carbon technologies for sustainable pathways.

MASTER'S PROGRAM DELIVERED BY PROFESSIONALS TO **TRAIN PROFESSIONALS**

Environmental transition is the major challenge for 21st-century engineers, a field where everything remains to be invented to address sustainability issues. The Specialized Master's Program Action is designed for recent graduates who aspire to become key players in this transformation by specializing in life cycle assessment (LCA) and industrial decarbonization strategies.

Offered by ESPCI Paris in partnership with Chimie ParisTech and Université Paris Dauphine, this program is part of the MERCASTO project, supported by the « Skills and Professions of the Future » initiative under the France 2030 funding scheme (ANR 24 CMAS-008). This support, provided through PSL, highlights the excellence and innovation of the training offered. Delivered by experts from both academia and industry, the program combines scientific excellence with practical approaches to shape the sustainable industry of tomorrow.



WHAT ARE THE TARGETED PROFESSIONS?

Upon completing the ACTION program, graduates will be able to pursue careers such as:

- **Life Cycle Assessment Engineer**
- **Life Cycle Assessment Expert**
- **R&D Project Manager**
- **LCA and Industrial Process Decarbonization Consultant**
- **Environmental Project Manager**
- **Eco-Design and Environmental Innovation Engineer**

The ESPCI program is co-accredited with Chimie ParisTech – PSL and developed in close collaboration with industrial partners, enabling the ACTION program to be structured to effectively address the needs of responsible engineers trained to tackle ecological and societal challenges.

ARKEMA | SAINT-GOBAIN | SYENSQO

Request for the Conference of Grandes Écoles (CGE) label in progress

TEACHING METHODS

The duration of the Specialized Master's program is 12 months, starting in October and ending the following October. An alternative January intake is also available.

The lectures, tutorials, seminars, projects, and the corporate mission are organized into Teaching Units (UE), each assigned a value in European credits (ECTS). This value is proportional to the total workload required of the student. The first semester accounts for 45 ECTS, while the second semester corresponds to 30 ECTS.

The program includes 360 hours of face-to-face classes, contributing to a total of 75 ECTS, of which 30 ECTS are allocated to corporate mission and thesis writing. During the admissions interview, candidates are evaluated based on their motivation, their level of technical training in engineering sciences, and English proficiency. A significant portion of the ECTS is dedicated to practical LCA application.

ADMISSION

- **Required level:** Conditions for admission to a specialized master's degree defined by the Conférence des grandes écoles. During the interview, applicants will be evaluated based on their motivation, level of technical education in the field of engineering science, and level of English.
- **Admission process:** Registration in year N : from February to June of year N. Receive application on an ongoing basis and decision make after oral interview on an ongoing basis.
- At the end of September of the Nth year, you will pay the tuition fee and sign an internship contract with the company.

inscription-action@espci.psl.eu

COST

Tuition fees are set at 7,000€ per year for a student from the European Union without a professionalization contract or apprenticeship contract, 15,000€ for a student from the European Union with a professional contract or apprenticeship contract, 20,000€ per year for a non-European Union student, and 20,000€ per year for staff with an employment contract in a company.

Students without a professionalization contract or apprenticeship contract may benefit from financial scholarships from ESPCI Paris – PSL, the PSL Foundation, or sponsorship from an industrial partner of the company where they will carry out their mission.

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CALENDAR

- From October of year N to mid-February of year N+1.
- 45 ECTS through courses at ESPCI Paris – PSL.
- **Semester jury:** before the last week of February.
- **Catch-up:** last week of February.
- **Corporate Mission (15 ECTS):** from March to the end of September of year N+1.
- **Defense of professional theses (15 ECTS):** during the month of September.
- **Graduation:** in the first week of October of year N+1.

PROGRAM

- Language: English | - Number of ECTS: 75

MODULE 1

COURS 1

Environmental science, system and energy

- 26h, 2 ECTS

Anthropocene; Ecosystem; Climate change; Environmental pollution; Biodiversity

COURS 2

Circular economy and industrial ecology

- 30h, 3 ECTS

Circular economy; Carbon neutral; Industrial ecology; Decoupling; Supply chain

MODULE 2

COURS 1

Process engineering

- 30h, 3 ECTS

Thermodynamic; Mass and Energy balance; Flow chart; Process modelling; Process simulation

COURS 2

Environmental impact and life cycle assessment

- 33h, 5 ECTS

Environmental impact; Life cycle thinking; LCA software; LCA modelling; Sustainability

COURS 3

LCA for public decision-making

- 20h, 2 ECTS

Decision making; Policy; Eco-labelling; Deposit-refund schemes; Uncertainty

COURS 4

Social and economic LCA

- 10h, 1 ECTS

Socio-economic impact; Social LCA; Life cycle costing; Sustainability; Life cycle thinking

MODULE 3

COURS 1

Industry case studies in LCA

- 33h, 5 ECTS

Case study; Business decision-making; LCA; Process optimization

COURS 2

LCA capstone project

- 98h, 15 ECTS

Project management; Group work; LCA modelling; LCA software

MODULE 4

COURS 1

Industrial Decarbonization Technologies

- 30h, 3 ECTS

Decarbonization; Trajectory; Environmental transition; Carbon footprint; GHG emission

COURS 2

Materials, Recycling, Polymers, and Enzymatic Catalysis

- 30h, 3 ECTS

Resource depletion; Material; Renewable energy; Recycling; Innovative technology

COURS 3

Eco-Design and Low-Tech

- 20h, 2 ECTS

Eco-design; Low Tech; Innovative approach; Technocritical approach; Initiatives

MODULE 5

Corporate Internship

- 15 ECTS

Internship; Industrial performance; Project management; Data analysis; Communication

MODULE 6

Specialized Master's Thesis

- 15 ECTS

Professional thesis; Research work; Practical solution; Strategic recommendation

Dauphine UNIVERSITÉ PARIS | PSL

Chimie Paris ParisTech | PSL

PARTNERS

ARKEMA

Leader in Specialty Materials, Arkema offers innovative and sustainable high-performance solutions to meet the challenges of new energies, new technologies, the depletion of resources, mobility and increasing urbanization. The Group generates sales of €9.5 billion and operates in nearly 55 countries with 21,100 employees worldwide.

www.arkema.com/global/en

SAINT-GOBAIN

Worldwide leader in light and sustainable construction, Saint-Gobain designs, manufactures and distributes materials and services for the construction and industrial markets. Its integrated solutions for the renovation of public and private buildings, light construction and the decarbonization of construction and industry are developed through a continuous innovation process and provide sustainability and performance. The Group, celebrating its 360th anniversary in 2025, remains more committed than ever to its purpose "MAKING THE WORLD A BETTER HOME".

- €47.9 billion in sales in 2023.
- 160,000 employees, locations in 79 countries Committed to achieving.
- net zero carbon emissions by 2050.

www.saint-gobain.com | **@saintgobain**

SYENSQO

Syensqo is a global scientific company with more than 13,000 employees, specialising in innovation and the development of solutions to improve various sectors, such as aeronautics, automotive, consumer goods and healthcare. Inspired by the conferences of Ernest Solvay, it aims to make products safer, cleaner and more sustainable, while promoting the circular economy and disruptive technologies. In 2023, it achieved a turnover of 6.8 billion euros, with 62 factories and 12 R&I centres worldwide.

www.syensqo.com

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www.espci.psl.eu/fr/formations/mastere-specialise-action

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