



ParisTech

**ENTREPRENEURSHIP
EDUCATION**
FROM AWARENESS TO BUSINESS CREATION

February 2022



Promote entrepreneurship education and support in ParisTech schools

In a society where the world of work (big companies as well as startups) demands more and more versatility, adaptability and innovation from the young graduates who are recruited, ParisTech's graduate engineering schools must keep a close eye on current developments and prepare their students as well as possible to enter their professional lives with all the necessary tools in hand, which will give them a wide choice of career opportunities after graduation.

They do this particularly by offering their students an introduction to entrepreneurship, entrepreneurship and technological innovation and by accompanying, training and supporting the students who have a project and wish to embark on an entrepreneurial adventure.

On a voluntary basis, the schools put in place educational measures that vary in form (courses, competitions, study projects, mentoring, etc.), whether they are course modules, specific courses or dedicated tracks along the entire curriculum. They are open to engineering students, and sometimes also to master's students or even PhD candidates.

To propose this, the schools rely on their internal and external ecosystems by calling on alumni, incubators, business experts, etc.

The purpose of this booklet is to present the different paths and proposals put forward by the various ParisTech schools to pursuing this common objective: to prepare the students of France's leading engineering schools to be the great leaders (whether in business or in society) of tomorrow.

Please notice that ParisTech schools admit students after 2 years of intensive preparatory classes in science (mathematics, and depending of their interest: physics and chemistry, engineering sciences, life sciences). Then the duration of the engineering curriculum in ParisTech schools is 3 years:

Y1: last year of bachelor

Y2: first year of master

Y3: second year of master / final year

Entrepreneurship in ParisTech schools Key figures

AgroParisTech

Nearly 30 start-ups created in the last two years

18 students winners of prizes for creation or maturation

More than 30 entrepreneurship projects accompanied by the school

Arts et Métiers

20 students from 100 applicants selected each year étudiants

80 projects since 2019

Chimie ParisTech - PSL

+280 students trained in entrepreneurship

Several prizes (Prize Fondation Vinci Autoroutes, Enactus Festival 2021, Prize Jeunes innovation 2021 France Chimie,...)

Institut d'Optique



+150 start-up projects




20 start-ups created since 2006

200-400 jobs created

+100 prizes for innovation

Some success stories

<p style="text-align: center;">  AgroParisTech <i>Talents d'une planète soutenable</i> </p> <p><u>Umiami</u> <i>Production of meat and fish from vegetable proteins</i></p> <p><u>Néolithé</u> <i>Transformation of non-recyclable waste into aggregates for use in the construction industry</i></p> <p><u>Iqemus</u> <i>Development of products for the note-to-note cuisine</i></p>	<p style="text-align: center;">  Arts et Métiers <i>Sciences et Technologies</i> </p> <p><u>Zozio</u> <i>Deployment of an intelligent logistics management solution for operators and managers in factories</i></p> <p><u>Medusa</u> <i>High-end electric motorcycles with a large part of craftsmanship and a 100% French manufacture</i></p>
--	---

<p style="text-align: center;">  PSL  <i>ParisTech</i> </p> <p><u>Tiny Bird</u> <i>Design of 100% natural and vegan organic fruit and superfood candies</i></p> <p><u>Koya</u> <i>Support solution for the ecological transition</i></p>	<p style="text-align: center;">  École des Ponts <i>ParisTech</i> </p> <p><u>Omni</u> <i>Use of electric scooters to motorize wheelchairs</i></p> <p><u>Ektos</u> <i>Design of augmented vision helmets to assist firefighters</i></p>
---	---

 INSTITUT d'OPTIQUE GRADUATE SCHOOL ParisTech  université PARIS-SACLAY	
<p><u>Stereolabs</u> <i>Development of a technology to correct the 3D-related visual discomfort</i></p> <p><u>Effilux</u> <i>Design of high power LED lighting for robotics, logistics, biomedicine</i></p>	

Audience	All AgroParisTech students (engineering students, master students, PhD candidates, students in advanced master programmes) and more broadly the AgroParisTech community
Pilot	An Implementation Committee composed of alumni, academic staff from different departments, the referent for entrepreneurship, external experts (coaches), partners (INRAE Transfert, Foundation AgroParisTech), a student representative and several people from the school's departments (teaching, communication, research and development, executive education, partnerships, etc.), which meets 3 to 4 times a year to improve the project's running.
Principles	Progressive accompaniment of students throughout their pathway to train them/raise their awareness of innovation and entrepreneurship, allow them to develop their first proof of concept and help them finance their projects (prizes, competitions, grants, fundraising...)
Objectives	<p>Raise students' awareness of innovation and entrepreneurship</p> <p>Support students who have a business creation project</p>
Ecosystem	<p>Operational internal ecosystem: implementation from 2016 of a network of open shared locations, the InnLabs, adapted according to the specific themes of each campus:</p> <ul style="list-style-type: none"> - Massy (and Palaiseau from 2022): Food'InnLab (accompaniment of projects FoodTech : alternative proteins, packaging, circular economy, sustainable food) - Claude Bernard (and Palaiseau from 2022): Roof'InnLab Bertrand Ney (urban agriculture and ecosystemic services) Nancy : Forest'InnLab (forest-related issues, from forest mangement to agro-forestry) - Grignon (Farm of AgroParisTech): Farm'InnLab -(accompaniment of AgroParisTech projects: experimentation of innovative technologies for livestock breeding, digital agriculture, robotics...) - Reims: le Center for Biotechnology and Bioeconomy (CEBB) - Clermont-Ferrand: Territoires'InnLab (dedicated to issues related to social, economical, food, agricultural transitions in the territories) <p>Support and accompaniment by AgroParisTech Innovation and support of Foundation AgroParisTech</p> <p>External partners: Carnot Institutes, INRAE Transfert, PEPITEs, Université Paris-Saclay, SATT Paris-Saclay, Incubators, Accelerators, innovation funders (business angels, investment funds...)</p>
Pedagogical path	<p>Itinéraire Entrepreneuriat : Students can use the Project course units in Y1, Y2, Y3 to make their entrepreneurial project their final study project</p> <p>Y1: initiation to entrepreneurship:</p> <ul style="list-style-type: none"> - Prize Creativity: organised each year in January. Priority target group: Y1, but open to all students at AgroParisTech. Prize : a few hundred euros + feedback of the jury on the project. - Education: 24h courses ; introduction to the entrepreneurial method thanks an online platform <p>Y2: prematuration</p> <ul style="list-style-type: none"> - a entrepreneurship course during the ATHENS week (about 30 hours introduction to entrepreneurship).

	<ul style="list-style-type: none"> - collective support: students work in teams and must gradually become the driving force behind their project and show their motivation through their involvement. A 10-minute pitch in front of a jury of experts. Students also develop different financial aspects related to any entrepreneurial project. Prize Maturation (2 sessions per year) : financial prize and support to the project. - Broad choice of elective courses as support to the project (science and technology, marketing, finance, project management, innovation, ...) <p><i>Gap year: some students take 6 months full time to develop their entrepreneurial project when they get the national status « student-entrepreneur »</i></p> <p>Y3: specialization</p> <ul style="list-style-type: none"> - Selection of the more relevant specialization for the development of their project - Project: some projects need a scientific and technical support relying on the school's labs, the Carnot Institute, INRAE Transfert, AgroParisTech Innovation, academic staff in SSH for the business model. - Prize Entrepreneurship: allows to labellize the project's feasibility. The Foundation grants a financial prize, coaching and skills sponsorship that can be continued. It's possible to be admitted in an incubator. - Students can do the internship in the final year by working on their project (they have to apply for the status « student-entrepreneur » in the frame of the PEPITE programme). <p>Students can work on different campuses (InnLabs) according to their project.</p>
Challenges and concerns	<ul style="list-style-type: none"> - Reflection on a proposal with evening classes, hybrid education, independently of the curricula, by relying on various resources of the University Paris-Saclay and the PEPITE programme - Upcoming evolution of some InnLabs due the transfert to Saclay
Impact	<p>83 projects Wire supported since the beginning and also prizes awarded by juries. Most of them have an environmental impact.</p>
Contact	<p>Catherine Lecomte, academic staff, in charge entrepreneurship</p> <p>Grégoire Burgé, deputy director of research and innovation, innovation manager and coordinator of the InnLabs' network</p>

Audience	<p>Engineering students willing to develop a technological innovation project in a company or their own business:</p> <ul style="list-style-type: none"> - All engineering students - PhD candidates from inane 2021 - Coming soon : students in advanced master programmes
Pilot	<p>A central programme available on all campuses</p>
Principles	<p>Putting student entrepreneurs at the service of industrial projects</p>
Objectives	<p>To develop the spirit of entrepreneurship To bring students to manage business aspects</p>
Ecosystem	<p>1 national coordinator 1 referent for entrepreneurship on each campus (total: 8) They work with</p> <ul style="list-style-type: none"> - the internal network: direction of education, research labs - the local network (PEPITE, incubators as partners)
Pedagogical path	<p>The Parcours Entrepreneuriat et Innovation Technologique (PEIT) is one of the three tracks proposed by the school to the engineering students.</p> <p>Y1: Detection and recruitment of future students in this track (individual application) Participation in "awareness" events (Entr'up, hackathons...) on all campuses (20 hours mandatory)</p> <p>Y2: Support and education (80h) Workshops, bootcamps, additional training modules Individual support proposed in partnership with the local incubator and the PEPITE programme so that students can develop their project</p> <p>Y3: Support and education (80h) Same programme as in Y2, compatible with technological expertise, a master programme in research or an international track Y2 + Y3: 160 hours (80 hours classes, seminars and 60 hours coaching)</p> <p>Classes take place on Saturday so that the students can experiment work during the week-end and the school test their real motivation (cf. entrepreneur without any week-end or holiday)</p> <p>The Entrepreneurship track is registered in the diploma supplement.</p>
Challenges and concerns	<p>The school first experimented with apprenticeship in Y1: 1 week of classes + 1 week of projects. But</p> <ul style="list-style-type: none"> - the economic model was not viable because it was necessary to duplicate the pedagogical model; - it was not comfortable for the students; - it only concerned 20 students. <p>The school concluded that the entrepreneurship track could not be integrated into the curriculum, hence the creation of the track.</p>

Impact	<p>This track attracts 2 types of students: 40 students (20 students-entrepreneurs + 20 intrapreneurs).</p> <p>The indicator is not the creation of businesses.</p> <p>Students are able to create a startup if they already have a mature project when they enter the school. The engineering curriculum is too intensive to let engineering students develop a business project.</p> <p>The creation of a a startup is not related to education, but to proactiveness, commitment and maturity of the student.</p>
Contact	Sandra Cologne, Innovation and Entrepreneurship manager



ParisTech



Audience	All engineering students, particularly 3Y students
Pilot	Department dedicated to the development of non-engineering competences: business environment, management, foreign languages, etc.
Principles	<ul style="list-style-type: none"> - Link between innovation and entrepreneurship - Learning by doing
Objectives	<ul style="list-style-type: none"> - To develop skills in innovation and entrepreneurship that are useful in different professional settings, including big companies - To provide a complete education that is not only dedicated to the creation of businesses - To contribute not only to the development of hard skills, but also of soft skills, or even mad skills - To focus on the development of the entrepreneurial spirit: to give them the desire, and if necessary to accompany them in the creation of a company
Ecosystem	<p>Close collaboration with</p> <ul style="list-style-type: none"> - the research labs (innovation dimension), - the school's incubator Chimie Paris Innov - more broadly the PSL ecosystem, - the Institute Pierre-Gilles de Gennes for microfluidics (Carnot Institute). <p>Objective: mobilize all school's work forces in interaction with partners to promote the creation of businesses and equip the students with methods and skills.</p>
Pedagogical path	<p>1Y Transdisciplinary project (TDP): 7 students work during 6 months in a teamwork condition on a topic proposed by companies. Objective: enable them to acquire the methods and postures of project management, teamwork and customer relationship with a more or less innovative dimension. Innovation week, May-June: discovering the innovation ecosystem in the school, labs' visit. Students work during 2 days on a topic proposed by a company in a format like hackathon (design thinking). Then the get feedback from the company on the innovative dimension of their proposal.</p> <p>Y2 Innovation Project (PIG): group innovation project (4-8 students) throughout the year on a technological topic submitted by a client (company or other). Students have to develop the project till development of a prototype.</p> <p>Y3: 2 educational forms exist Seminar Entrepreneurship (all students): practice and experimentation Partnership with Université Dauphine – PSL and/or consultants, school's academic staff Objective: experience the development of an entrepreneurial project over about 2 months (business plan, strategy)</p>

	<p><u>Module Innovation and Entrepreneurship (elective courses) for students who want to go further</u></p> <p>Students are accompanied during 5 months by a partner company, Boss Consulting, in cooperation with the school's Department for Management, in an international setting. Students work with coaches and mentors (innovation, marketing, finance), entrepreneurs or business angels. They present their project to a jury of investors.</p> <p>Internship in Y3 on the business project. The student can obtain the status of « student-entrepreneur » in the frame of the PSL PEPITE programme and do their internship in final year on their own business project.</p>
<p>Challenges and concerns</p>	<ul style="list-style-type: none"> - Measure the impact of this education on the school's global dynamic - Articulate short-term and long-term issues (students do not necessarily want to create a company after leaving school, but later, after a PhD or after a few years of active life, which is not necessarily negative) - Associate entrepreneurship with the school's global ecosystem, and create and maintain an ecosystem that goes beyond the school (PSL Innovation, PSL PEPITE, creative alumni as role models, associations such as Enactus...)
<p>Impact</p>	<p>All students studying at Chimie ParisTech in Y3 are introduced to entrepreneurship in the entrepreneurship seminar of the core curriculum (about 80 students/year).</p> <p>Approximately 10 students participate in the Y3 Innovating and Entrepreneurship module each year. Some of them start their own business right out of school, others after a few years.</p>
<p>Contact</p>	<p>Philippe Vernazobres, assistant professor, Director of the Department Management Languages and Culture</p> <p>Delphine Bourland, teacher, Department Management, referent for entrepreneurship</p> <p>Michael Tatoulian, Deputy Director Chimie ParisTech, in charge of innovation and the incubator Chimie Paris Innov</p>



École des Ponts
ParisTech

<p>Audience</p>	<p>All engineering students as well as PhD candidates who have an idea or who develop business projects on scientific innovations related to real societal challenges</p> <p>PhD candidates (support)</p>
<p>Pilot</p>	<p>Innovation and design center in collaboration with thematic departments or research laboratories</p>
<p>Principles</p>	<p>There is no specific training path; students who wish to follow or pursue an entrepreneurial approach take the status of student-entrepreneur and choose a certain number of specific classes that can help them develop their project.</p>
<p>Objectives</p>	<p>Introduction to entrepreneurship</p> <p>Promotion and support to student entrepreneurship</p>
<p>Ecosystem</p>	<ul style="list-style-type: none"> - Internal school network: dedicated spaces within the school (e.g. makerspace for prototyping, Build'in Lab), innovation and design center - External network: <ul style="list-style-type: none"> - Fablab Descartes - Incubator Descartes - Incubator GreenTech verte - Station F : 40 places for startups incubated at school - Club Genius Ponts - PEPITE 3EF
<p>Pedagogical path</p>	<p>1. Introduction: events outside the curriculum</p> <p>Nuit pour entreprendre (Night for entrepreneurship) <u>Objective:</u> encourage engineering students to take the lead and develop their entrepreneurial spirit <u>Participants</u> : about 60 students from the school and partner schools, particularly from ParisTech school and other academic partners (Paris-Est Sup, IP Paris) <u>Coachs</u> : young creators of startups, senior experts, CEOs, academic representatives of the School, employees from partner companies <u>Time schedule:</u> 18:30 – 10:30</p> <ul style="list-style-type: none"> - End of the afternoon: conference by a startup - Evening: societal topics are discussed by students who do not know each other and form teams. They are then coached to develop their ideas and often the topic itself. - Night: they work in small groups on an innovative project - Morning: they present their business project in front of a jury (members of École des Ponts ParisTech, entrepreneurs and guests) in the form of an oral pitch including a business plan and a 3-minute video. <p>Companies give out awards.</p> <p>Ponts Startup Day Partnership with the student club Genius Ponts <u>Objective:</u> student teams have to face concrete issues (business, technology, marketing) proposed by startups and find out a solution</p>

	<p><u>Conditions:</u> use of thinking tools, in particular design thinking, to address the problem; support throughout the day by supervisors from these partner startups, themselves supported by experts and teachers from the School.</p> <p><u>Time schedule:</u> 1. Testimony of an entrepreneur who graduated from the School; 2. Team work ; 3. Restitution of their results of their work to the startups; 4. Cocktail (networking, discussion on the results of the day).</p> <p style="text-align: center;">2. Entrepreneurship in the engineering curriculum</p> <p>An "entrepreneur" pathway can be included in each of the different tracks offered in the departments. The study plan is then adapted: classes in sciences, training in innovation, business management and entrepreneurship, management and marketing, transition and Corporate Social Responsibility (CSR).</p> <p>The ME310 program, based on the Stanford model, allows engineering students in their final year to replace their "classic" final year of engineering with a group project based on a company's order, using the most varied innovation methods taught in the innovation and design center.</p> <p>This year can allow future students to mature their project. This program is followed in parallel and with the same rhythm by students from another international or European higher education institution or university.</p> <p>Support for student-entrepreneurs:</p> <ul style="list-style-type: none"> - supervision by academic staff, tutoring, legal and financial services; - use of the school's dedicated spaces, possibility of pre-incubation on the school's premises; - for young graduates or PhD candidates, the opportunity of taking additional courses as an auditor corresponding to specific needs. <p>Opportunities linked to the status of student-entrepreneur to validate his internship or final project (PFE) on the entrepreneurial project, either individually or collectively.</p> <p>The topic must correspond to the resolution of a complex systemic problem that advances society.</p> <p>The PFE must be supervised by a professional tutor in the relevant field.</p>
Challenges and concerns	<p>Students often wait until they are in their second year, following a thematic course of study and carrying out projects on their own or in groups before starting to develop a business project. This project is most often carried out after graduation.</p> <p>Developing entrepreneurship in lifelong learning</p>
Impact	<p>Around 10 students per year and 10 PhD candidates (not necessarily graduate engineers from the school)</p>
Contact	<p>Nuit pour entreprendre & Ponts Startup Day: Valérie Joly, relationships between education and businesses manager</p> <p>Accompaniment of engineering students: Gustavo Boriolo, Corporate Partnerships manager</p> <p>Doctorate, accompaniment of PhD candidates-entrepreneurs : Emmanuel Girard</p>

Audience	Engineering students
Pilot	Entrepreneurship track (Filière Innovation-Entrepreneurs, FIE)
Principles	<ul style="list-style-type: none"> - Introduction to a broader spectrum than entrepreneurship (all engineering students in Y1) - Opportunity to taking the Entrepreneurship track over 2 years (Y2 and Y3)
Objectives	<ul style="list-style-type: none"> - Potentially open the door to a business project, and more broadly to the observation of their future profession (make the link between their passion, their interests and draw their future profession even if they do not continue on the path of entrepreneurship) - Learn to approach their professional life in an entrepreneurial dynamic: with agile development methods close to the development mode of a startup
Ecosystem	<p>Entrepreneurship centers (Centres entrepreneuriaux): The « 503 » (location for mature technology companies) in Saclay, Bordeaux and St Etienne.</p> <p>Commitment charter: they must participate in the development of the training part and in the accompaniment of the students partners of project, in order to create a local dynamics. The Institut d'Optique awakens and accompanies the transmission between startups and students by putting in contact the stakeholders who are at the heart of these 503 Centers.</p> <p>External partners: PEPITE programme</p>
Pedagogical path	<p>Y1:</p> <ul style="list-style-type: none"> - to discover, at the end of the preparatory class, that they can reinvest their strong academic skills in teamwork; - have students work on their ambition to become entrepreneurs and on their project idea (idea, team building, identification of how to start the project); - engage them as soon as possible to confront their ideas with the field, and thus to confirm their hypotheses: realization of the business project with the technological dimension and the market dimension, by going into the field to apprehend the needs and the market. <p>Y2: prototype and market study</p> <p>The students start with their ideas to create the dynamics of the project and have to face the reality of the field, they come back with this key information, in startup mode. Forum where all the projects are presented to the 503 entrepreneurs. Mock-up made in the fablabs.</p> <p>If the project is not satisfactory, the Institut d'Optique calls on external idea providers.</p> <p>Semester 2: Elaboration of a business model, premise of the business plan.</p> <p>Y3: Accompany the structuring of the company in view of its launch; identification of an engaging business plan that puts in place the right milestones in the short term:</p> <ul style="list-style-type: none"> - contractualization, realization of the business plan with the targeted actors; - identification of key partners: big companies, sometimes laboratories, to be able to work hand in hand on this project, give credit to the project and secure the project; - international trade, launch of local incubators...

	<p>Go as far as launching the company at the end of the internship, or even before, and then continue in the 503 Centers or elsewhere for the most motivated students.</p> <p>When students complete their internship to launch their project, they have set their own roadmap: from pedagogues, the academic staff become coaches like those found in incubators so that students can launch their business.</p> <p>The alumni present at 503 Centers give back what they have received by accompanying the projects.</p>
Challenges and concerns	<ul style="list-style-type: none"> - Continue and strengthen this dynamic and open it up more to the public, involve companies who could develop cooperative projects with the research. - Think about the possibility of Institut d'Optique taking a stake in startups: this deserves strategic consideration, as it could dampen the initial spirit of creativity. - Develop pedagogical methods internally, as the Entrepreneurship track's pedagogy is very different from that of other programs where it is very top-down.
Impact	<p>More than a quarter of the class (150 students) involved in the Entrepreneurship track</p> <p>20 companies created by students</p> <p>130 prizes awarded since 2008</p>
Contact	David-Olivier Bouchez, National manager of the Entrepreneurship track