Summer School 2023
Sustainable Cities of the Future

ESTP PARIS
L'ÉCOLE DES GRANDS PROJETS

epf
ENGINEERING SCHOOL
Creating the future together

July 3rd to 13th 2023
Troyes & Paris-Cachan, France

FULL ENGLISH PROGRAM

THE TECHNOLOGIES OF NATURE

BIO- CITY I BIO-ARCHITECTURE I BIO-ENERGY I CIRCULAR BIO-SOCIETY

Innovation, engineering, architecture, and ecology are brought together in **an exciting two-week summer program**.
Come and explore how sustainable thinking **can be inspired by the laws of nature** and **how technology can contribute to creating sustainable cities** for the future.
Built around the topics of **Bioenergy, Bio-Architecture, Bio-Technology and Circular economy and Bio-Society**, the 2023 summer school is a journey from theory **to practice experienced** on campus, in companies and research laboratories, in nature, and in cities.

Practical information

Find out at a glance what you need to know before applying for our Summer School !

WHEN

Monday, **July 3rd**, 2023 - Thursday, **July 13th**, 2023
Week 1 : Troyes - **Week 2** : Paris-Cachan
Application deadline: Wednesday, May, 31st, 2023

WHERE: Troyes and Paris-Cachan, France

PROGRAM LANGUAGE: English

WHO

We invite students from engineering, architectural, urbanistic, environmental and societal studies, or related fields to join us for an innovative, multidisciplinary, and exciting two-week summer program.

REQUIRED ACADEMIC LEVEL

- Master's degree students
- Ph.D. students
- Young researchers and professionals who want to improve and find new opportunities in their work and research
- Advanced Bachelor's degree students are welcome
- Recommended English level: B2

PROGRAM TUITION FEES

The program fee is **1500€** and includes :

- Tuition and documentation
- Welcome and farewell events
- Access to ESTP Paris and EPF facilities
- Free internet access
- Official program certificate
- Cultural and social events
- Transfer between Troyes and Paris-Cachan

Accommodation is not included but you will find a list of accommodation options on page 5.
Living expenses, individual insurance, and visa fees are not included.

6 GOOD REASONS TO PARTICIPATE!

1. Earn 3.5 ECTS

2. Be part of an integrative and multidisciplinary approach to the topic and latest materials and technologies applied to the field of bio-architecture and bio-urbanism presented by French and international experts from universities, research institutions and companies

3. Have fun while enjoying a multicultural and multidisciplinary experience and start creating your future

4. Visit research laboratories and companies and be inspired by firsthand professionals

5. Build an international professional network

6. Enrich your profile with cultural visits and field trips

Programme, week 1

ESTP Paris Troyes campus

3/7

▸ CONNECTIONS: SUSTAINABILITY – CITIES – TECHNOLOGY: SYNERGIES AND CHALLENGES

The course gives participants a broad perspective of the interface between sustainability and intelligent technologies. It is also focused on facilitating a critical approach to the junction between technologies and sustainability for developing the ability to understand both positive and negative aspects of the technologies, identify all the impacts, and have a holistic approach to the choices in various contexts.

▸ THE HUMAN CREATIONS: ENGINEERING, ART AND SUSTAINABILITY

Humans need to create and connect to the creation of others, but they also need to be part of nature. Art and technology are two modalities by which the ability of humans to create is expressed.

They are both part of our everyday life, but how do they connect with the two faces of humans? How do they ethically contribute to societal development and technology implementation? Where is the delineation between better and worse, need and desire, beauty and technology? These are questions that remain to be answered to a greater extent.

This workshop will allow students to explore these answers by changing their perspective toward the interface between art and technology.

4/7

▸ ECOLOGICAL REDIRECTION OF THE URBAN: ECOLOGICAL STRATEGIES TO FACE THE CHALLENGES OF THE ANTHROPOCENE

First, this course explores the concepts of the Anthropocene, Great Acceleration, Planetary Boundaries, and Technosphere. Then it applies a critical perspective to the dominant ecological strategies followed by the introduction of the Redirective Ecology approach, including its essential concepts like heritage closing, zombie technologies, living technologies, and negative commons, as well as its tools such as sociological inquiry (pragmatist approach), the notion of attachment, and design.

As an application for illustrating these concepts, two recent redirective inquiry examples will be discussed: the closing of public pools and the decision to forgo new housing construction.

▸ SERIOUS GAME: INCLUSIVE LAND SOBRIETY

This serious game workshop is mobilizing the concepts of Anthropocene and planetary limits. It immerses players in a new state of the world, where global warming and biodiversity erosion are only some aspects. Thus it raises awareness of the impact of various current practices to meet our housing production needs. This game highlights our cosmology of new construction and reveals our attachments and dependencies at the source of our choices.

5/7

▸ BIO SOURCED MATERIALS FROM THEORY TO PRACTICE

Bio-based materials advocate a return to low-tech, natural, and ecological solutions. Biological processes inspire research programs, architects, and builders to create sustainable buildings and cities. New materials and material components were developed recently, such as natural fibers, which are used to increase concrete cracking and thermal resistance. Moreover, vegetable fibers are known for increasing mechanical resistance and as a reinforcement for composites.

This course will introduce students to bio-sourced materials, their behavior, and their applicability in construction. Examples will be discussed.

▸ BIO-CLIMATIC AND REGENERATIVE ARCHITECTURE

This course will take students on a journey of case studies from low-tech to advanced solutions in bioclimatic and regenerative architecture selected to foster innovative discussions on the theme of sustainable cities of the future.

Company visit - biomasse bio énergie

6/7

▸ BIO-URBANISM AND GIS
▸ GEO EMOTIONS MAPPING

Urban landscapes rapidly expand globally, and over 50% of the human population lives in urban areas.

Because most human settlements are in areas of high biodiversity, the world's rapid urbanization has profound effects on global biodiversity.

Bio-urbanism and GIS and Geo Emmotions Mapping is a seminar course with a mix of lectures and discussions, with a focus on geoscience and the processes determining patterns of abundance and distribution of organisms in urban ecosystems, the interactions among organisms in the urban environment, the interactions between humans (and societies) and nature in urban environments, and some aspects of urban planning as it relates to ecology and the environment.

VISITS:

- Guide tour of the city
- Visit of the Cité du Vitrail

Programme, week 1

7/7

▸ SUSTAINABLE CITY DEVELOPMENT (PART 1 & PART 2)

In this lecture, an overview on different techniques of urban growth and LUCC modelling including the artificial intelligence based modelling is presented. We will review the urban sprawl and dense growth and we will find out the impacts of each on environment and land artificialisation.

Indeed, smart cities are connected cities using all types of technologies to improve the daily life of their inhabitants. The use of biometric techniques in cities can be associated with different issues such as transportation and urban planning. Biometry uses various sensors that have been developed in recent years with a proven ability to acquire not only two-dimensional texture information but also the shape of the face, i.e. three-dimensional information.

Later, we describe a smart city, and talk about different biometric techniques that can be used in a smart and sustainable city.

Finally, we discuss the digital twins of construction and infrastructure at the city scale.

▸ BIO-CLIMATIC TEST CELL BBC+: A REAL-SCALE EXPERIMENTAL PLATFORM TO INVESTIGATE THE ENERGY PERFORMANCE OF BUILDINGS

The experimental facility BBC+ is a full-scale test cell designed with a dual purpose allowing both the study of the characterization of the building envelope materials and the thermal comfort assessment.

First, this course aims to explain its capabilities and characteristics and how we use it to perform our experimental investigations.
Then, some empirical research will be presented to illustrate the experimental protocols and describe the research objectives for improving building energy performance and comfort. Finally, the presentation of some experimental investigations using the test cell will complete the lecture.

▸ FROM DIGITAL MODEL TO VISUALIZATION IN VIRTUAL REALITY

This course aims to introduce digital modeling, including how it differs from a simple 3D model. Additionally, we will explore software that allows for photorealistic renderings and delves into the use of virtual reality helmets for visualizing and interacting with the environment. This exploration will examine various aspects such as time, weather, and material textures.

By the end of this course, students will have gained an introductory understanding of digital construction technologies and their practical applications. This understanding will enable students to explore how these technologies can be leveraged to improve construction processes and project outcomes.

ESTP Paris Troyes campus

Programme, week 2

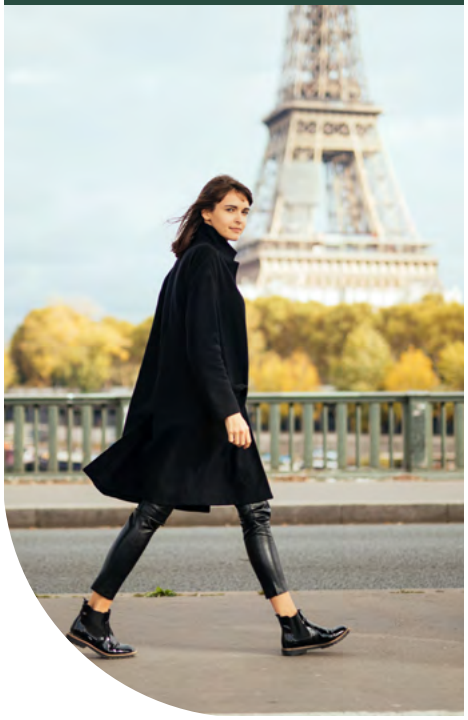
EPF Paris-Cachan campus

8/7

Transfer from Troyes to Cachan in the morning - Free time in the afternoon

9/7

Free time



10/7

▸ **BIO-BASED MATERIALS IN CONSTRUCTION**

This module aims to:

- give an overview of the different types of Bio-based materials used in construction in particular the reinforcement of concrete by natural fibers,
- understand the importance of bio-based materials to build environmentally friendly structures,
- understand the effect of the bio-based materials on the mechanical and chemical behavior of concrete.

▸ **FIBER - REINFORCED CONCRETE: LAB APPLICATION**

11/7

▸ **AI APPLICATIONS FOR SUSTAINABLE MATERIAL DEVELOPMENT**

In this course, we will explain how the digital transformation in materials science and engineering requires and enables more and more the application of algorithms of artificial intelligence for data processing, data exchange and data analysis in materials characterization. Consequently, future tasks of scientists and engineers will include collecting and interpretation of data, in addition to the development and application of advanced techniques for materials analysis.
Therefore, the main focus of this course is to explain how AI is used to :

- analyze data and identify patterns and trends that can help in generating new ideas for construction material design,
- calculate the key properties of materials and identifying the best ones for further in-depth analysis, characterization, and verification,
- classify materials,
- detect defects in materials before they even occur, improving the reliability and efficiency of existing manufacturing processes.

▸ **THE LAWS OF NATURE: CONSTRUCTAL LAW AND FRACTAL GEOMETRIS AND THEIR APPLICABILITY IN ARCHITECTURE AND URBAN PLANNING**

This course will summarize the ecological and biological approaches to various sustainability and technological interventions to clarify how the interface between the natural realm and human creations can be optimized. It will also discuss biophilia and biomimicry's potential contribution to shaping our cities' future through ecological innovation, acting, and ecologic thinking.

Field visit - Urban Farms

12/7

▸ **RENEWABLE ENERGY AND SMART GRID: INTRODUCTION**
▸ **RENEWABLE ENERGY AND SMART GRID: APPLICATION**

In this first part of course, you will be introduced to the definition of a renewable energy. In the second part we introduce Smart electric power grids, including definition, design criteria, technology and IoT. We will end the course by explaining how these technologies can be applied in order to optimize the generation, the transmission, the storage and the consumption of electrical power.

Cruise on the Seine river

13/7

▸ **PROJECT FINALISATION**
▸ **PROJECT PRESENTATION**
▸ **CLOSING CEREMONY**

Lecturers

DANA OPRISAN

Associate Research Professor, Co-chair of the Sustainable Architectural Engineering Masters Program, EPF Graduate School of Engineering, Troyes Campus, France

Dr.Dana OPRISAN has a multidisciplinary medical, architecture, and sustainability background. Her professional focus is on the interface of architecture, health, and sustainability. Before moving to France, she was an architect in sustainable design, a researcher at Biophilic Practice Group, Washington DC, and faculty at Marymount University, VA. She holds an M.D. degree from the Carol Davila University of Medicine and Pharmacy, a B.A. and M.Arch. from Ion Mincu University of Architecture and Urbanism, Bucharest, Romania, and an M.S. in Sustainable Design, Catholic University of America, Washington, DC. Since 2020 she has been an Associate Research Professor and co-chair of the Sustainable Engineering masters program at EPF Graduate School of Engineering, where she teaches sustainable architecture and design on the Troyes Campus. Her research has a transversal and multidisciplinary approach and encompasses human biology, architecture, technology, and environmental studies. She is particularly interested in fractal geometries and their applicability in building design and urban planning, as in the connection between the environment and human health and psychology.

PHILIPPE BOUTEYRE

Founder and Consultant in Redirective Ecology and Low Carbon Strategies at PRAXILIENCE, Lecturer CentraleSupelec Paris and Renault Technocentre

Philippe has 25 years of experience managing complex industrial projects in the energy sector. He founded PRAXILIENCE to support organizations in developing their low-carbon strategies and ecological redirection. Philippe uses carbon assessment, systems thinking, and design techniques to help clients achieve their sustainability goals. He is also a certified INCOSE Systems Engineer and holds degrees from ENSAM and ESSEC (Executive MBA) and an MSc in political ecology. In 2021, Philippe conducted an ecological redirective inquiry on renouncing newbuild for a real estate company.

BASTIEN MARCHAND

PhD student in Redirective Ecology, AMU (Aix Marseille Université)

Holder of a Master of Science in political ecology, Bastien is pursuing a Ph.D. in redirective ecology in partnership with Auxilia Conseil and the CNRS. His research explores the political, strategic, and practical implications that this «ecology of closure» may have on the role of local governments, land use planning, and public policy. In 2021, Bastien inquired about a redirective protocol for the municipal swimming pools of Grenoble. He now centers his work on territorial attractivity and inquires on a famous French museum.

OMAR SAIFOUNI

Associate Research Professor, Co-chair of the Sustainable Architectural Engineering Masters Program, EPF Graduate School of engineering, Troyes Campus, France

Omar Saifouni is a Civil Engineer and a Ph.D. holder who studies at Blaise Pascal University- Clermont-Ferrand between 2011 and 2014. His research focused on bio-based materials and their behavior under long-term mechanical loading and hygrothermal effects. Omar carried out experimental tests in his study, allowing him to develop analytical models and understand and predict the bio-sourced behavior under variations of loading and relative humidity. He started his academic career in 2013 as a lecturer and researcher at the French Institute of Advanced Mechanics. He continued as an assistant professor at the Institute of Automobiles and Transportation. (ISAT). Since 2017 he has been an Associate Research Professor at EPF Graduate School of Engineering. In addition, he is the Sustainable Architectural Engineering Master Program co-chair and teaches solid mechanics, building structures, and BIM. As a civil engineer, Omar is mainly inspired by bio-based materials, especially in building construction, as one of the sectors that consume energy and emit carbon dioxide.

Lecturers

ETIENNE FAMIN

Architect, Lecturer ate EPF School of Engineering and SciencePo

Etienne Famin is a French architect born in 1978. After his childhood in New Caledonia, he came to Paris, where he completed a master's degree in Architecture from the École d'Architecture de la Ville et des Territoires in 2004. He spent his early practice in renowned Parisian architecture offices such as ADPi/Paul Andreu and SEURA/David Mangin. He worked on town planning or large-scale buildings and infrastructures, including the CDG airport and the Forum des Halles mall & transportation hub in the center of Paris. Since 2008, Etienne Famin has driven his architecture office, which is specialised in energy-efficiency refurbishments and sustainable buildings for public and private owners. He draws his inspiration from vernacular and High-Tech architecture, aiming to combine the two opposites in each of his projects. Etienne Famin is also a lecturer at the EPF Graduate School of Engineering in Troyes and Sciences Po Paris. He holds an MBA from the ESSEC Business School and a master's degree in Real Estate Finance from Sciences Po Paris.

CHRISTINE WATCA

Assistant Professor in the College of Behavioral and Social Science, School of Human Ecology,Georgia Southern University, U.S.A. GeoEduGAMING.INC. Founder and president

Dr. Christine Wacta is an architect, Urban Designer, and Assistant Professor in the College of Behavioral and Social Science, School of Human Ecology, Georgia Southern University, U.S.A. Her interests focus on geoscience, geospatial methods, advanced analytics, and visualization. Her research includes geoscience and Artificial Intelligence's integration into design via gamified principles and mechanisms. Dr. Wacta is the founder of Geo-EduGAMING. Inc and other Geospatial initiatives geared toward intersecting Geoscience, Game, and Design education. For over 19 years, she taught and developed graduate and undergraduate curriculums in various fields. With a global background and training, she successfully implements her diverse skillset on cross-disciplinary collaborative platforms. She is interested in reconciling Urban &Natural Ecology with Human Ecology to rehabilitate innate human connection with our environment. Her interest is in Real and virtual experience Platforms, PAA (Platform As Service), Spatial definers of human experience, human habitus and interactions, spatial cognition and mental representation of space, virtual memory projection in time, space surface and depth, real-time dashboard, spatialization of spatiotemporal events stored in a Geo-InfoHUB. She is currently leading multi-disciplinary, cross-curricular learning activities by involving multiple fields to varying degrees on the same continuum within the undergraduate Start-up research group at Georgia Southern University. As a visionary leader and influencer, she developed Geo-enabled learning approaches that fit the new digital learners and believes that an AI-enabled technological evolution emerged as a disruptive force and should be used to intersect intelligence, automation, and geoscience with advanced robotics to tackle the increasingly complex challenges of 21st-century' society.

ABDELATIF MERABTINE

Associate Research Professor, EPF Graduate School of engineering, Troyes Campus, France

After completing his Ph.D. in Mechanical Engineering at the University of Lorraine (France) in 2012, Abdelatif served as a lecturer at the Department of Civil Engineering at Ecole Normale Supérieure de Cachan - Ile de France. Since 2013, Abdelatif has been an Associate Research Professor at EPF School of Engineering - Campus Troyes. He oversees the experimental platform BBC+, including a full-scale monitored test cell facility he designed and developed. Abdelatif's research focuses on the experimental analysis of the heat transfer at different scales of the building envelope and the energy performance of the HVAC systems. He also works on multi-optimization investigations, including sensitivity studies applied to building physics and HVAC systems for thermal comfort.

Lecturers

BILAL AMGHAR

After completing his master degree in Electrical Engineering (2009) and PhD in electrical engineering (2013) University of Cergy, Dr. AMGHAR Bilal is a specialist in energy and the smart city.

During his first professional experience, he was responsible for European projects in particular BCAPP qualified Business Check APPlication and participated in academic and industrial research projects (Hyro+, Seinergy Lab, SMART GRID, etc). He has also supervised several theses on energy mixes (Microgrid, Smartgrid, On-board energy, etc)

After a first experience of 9 years in a school of the ECAM group, he is currently an Associate Research Professor in the field of SMART CITY and SMART GRID at ESTP Paris, Cachan Campus. He is also responsible of the electricity laboratory and the SMART GRID platform at ESTP Paris.

MOJTABA ESLAHI

Dr. Mojtaba Eslahi is an associate research professor in geoinformatics and digital systems. He works at the Institute of Constructibility Research - ESTP Paris.

He holds a civil engineering degree, a master's degree in data mining/machine learning, biometrics and 3D modeling, and a PhD in Geographic Information Science and Technology. He has professional skills in building information modeling, geographic information system, city information modeling and various experiences in the construction field.

He is a member of the scientific committee and the operational committee of the Digital Twins Chair. His current research focuses on BIM, GIS, CIM and Digital Twins for construction and infrastructure. He co-supervises several PhD theses and internships, mainly on the topic of Digital Twins and Urban system.

ASMA ACHNIB

Asma ACHNIB received a degree in Electrical and Automatic Control Engineering from the National Engineering School of Gabes (ENIG), Tunisia in 2015, and a Ph.D. degree from University of Bordeaux, France in 2019.

From 2019 to 2021, she worked as a lecturer at Grenoble Institute of Engineering.

Currently, she is an Associate Professor at the Special School of Public Works, Building and Industry (ESTP Paris).

Her research interests lie in the fields of preview and robust digital control, with applications to energy management systems of a smart grid and automotive suspension systems. Recently, she has also focused on estimating the state of charge and state of health of lithium-ion batteries.

Accommodation options

Prices may be subject to changes.

IN TROYES

▸ **SMART APART TROYES**
47 rue Louis Mony, Troyes
https://www.smart-appart.fr/fr/hotels/troyes-smartappart-troyes
- **Price:** 50€/night for a standard single room - 59€/night for a deluxe room (bigger)
- **Reservation:** send an email to *troyes@smart-appart.fr* with « Summer School EPF-ESTP » in the subject line.

▸ **HÔTEL LE SPLENDID**
44 bd. Carnot, Troyes
https://hotel-lesplendid.fr/
- **Price:** 60€/night (tourist tax and breakfast not included)
- **Reservation:** send an email to *hotel.le.splendid@orange.fr* with « Summer School EPF-ESTP » in the subject line.

▸ **BRIT HÔTEL COMTES DE CHAMPAGNE**
56 rue de la Monnaie, Troyes
https://hotel-troyes.brithotel.fr/
- **Price:** 60€/night (tourist tax and breakfast not included)
- **Reservation:** send an email to *troyes@brithotel.fr* with « Summer School EPF-ESTP » in the subject line.

▸ **KOSY APPART'HOTELS – RÉSIDENCE EQUALIS**
(situated between ESTP-EPF campuses and Troyes city center) - **26 av. Anatole France, Troyes**
https://www.kosy-apparthotels.com/troyes-equalis/
- **Price:** 52€/night for single room
- **Reservation:** send an email to *citypark@kosy.plus* with « Summer School EPF-ESTP » in the subject line.

IN PARIS-CACHAN

HOTEL-TYPE ACCOMMODATION

▸ **SÉJOURS & AFFAIRES PARIS BAGNEUX**
204 av. Aristide Briand, 92220 Bagneux
https://www.sejours-affaires.com/uk/hotel-residence-aparthotel-bagneux-286.html
- **Price:** from 76€/night (tourist tax and breakfast not included)
- **Reservation:** send an email to *paris.bagneux@sejours-affaires.com*

▸ **RÉSIDENCE CHLOROPHYLLE**
63 av. Aristide Briand, 94110 Arcueil
https://residence-chlorophylle-arcueil.hotelmix.fr/
- **Price:** from 73€/night (tourist tax and breakfast not included)
- **Reservation:** online on their website

▸ **JO&JOE PARIS GENTILLY**
89 av. Paul Vaillant Couturier
https://www.joandjoe.com/fr
- **Price:** from 375€/week for a single cabin

▸ **HÔTEL ARC PORTE D'ORLÉANS**
11 rue Gabriel Péri, 92120 Montrouge
https://www.hotelarcparismontrouge.com/chambres/
- **Price:** from 84€/night for a single room
- **Reservation:** online on their website

Other options can be found on booking.com and Airbnb.com

HOMESTAY

▸ **SÉJOURS FRANCE FAMILLE** - Paris
https://www.sejoursfrancefamille.com/index.php/booking-options/
- **Price:** 259€/week for a standard single room Bed & Breakfast - 234€/week for a twin room Bed & Breakfast (registration fees not included)
- **Reservation:** online on their website *https://www.sejoursfrancefamille.com/fr/index.php/je-reserve/*

▸ **ATOME PARIS** - Paris - accomodation in a family
https://www.atomeparis.com/en/fees/
- **Price:** from 30€/night – Bed & Breakfast
- **Reservation:** by email for short stays at *contact@atomeparis.com*

ON-CAMPUS STUDENT RESIDENCE

▸ **MAISON DE FAMILLE / ESTP PARIS** - Cachan Campus
28 av. du President Wilson, 94234 Cachan
- **Room-type:** studio apartment
- **Price:** 350€ for one week
- **Check-in:** on July 8th
- **Check-out:** possible to extend the stay until Monday, July 17th with no extra charge.
- **Pre-reservation:** by email at *nbendrimia@estp-paris.eu*. Further booking instructions will be sent by email

Please note that these listings are for informational purposes only, and bookings must be made directly through the respective websites or booking platforms. We do not handle any bookings or reservations for these accommodations. It is the responsibility of each participant to visit the website of their chosen accommodation option and follow their booking procedures.

How to apply for Summer School?

Minor changes in the program may occur.

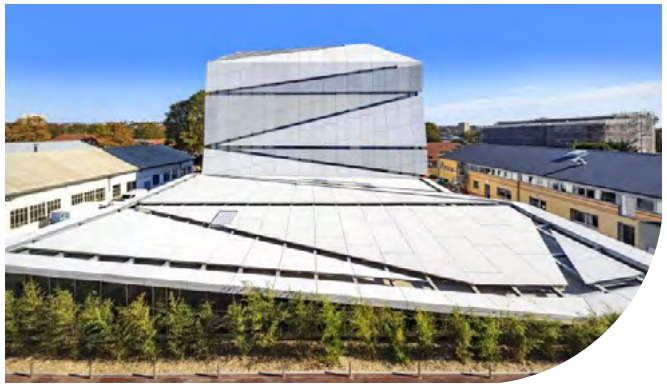
ONLINE APPLICATION & REGISTRATION ON ESTP STUDENT PORTAL

REQUIRED DOCUMENTS

- Latest degree certificate/diploma or proof of enrollment in an academic program
- Letter of motivation
- Passport or National Identity Card for EU citizens

APPLICATION DEADLINE

Wednesday, May, 31st , 2023



ENGINEERING SCHOOL
Creating the future together

ESTP
PARIS
L'ÉCOLE DES GRANDS PROJETS

EPF, ENGINEERING SCHOOL

Created in 1925, the EPF, formerly the Ecole Polytechnique Féminine, was one of the first major school in France to train women as engineers. Since then, the school has kept reinventing itself to train more than 12,000 innovative, daring and committed graduates in all sectors of industry and services. Since its creation, the EPF has cultivated a spirit of openness that is a hallmark of its identity.

ESTP, SCHOOL FOR MAJOR PROJECTS

Created in 1891, ESTP Paris is the leading engineering school in the construction sector in France. It counts over 2,800 students every year and trains the largest number of students flow for the construction and civil engineering industry. ESTP Paris is renowned for its close links to industry, its strong international relations, its equal opportunities policy and the emphasis put on sustainable development.

APPLY NOW

ANY QUESTIONS ? Please contact us: summer-school@epf.fr - information.summer@estp-paris.eu