



A CLOSER LOOK

AT OUR ENGINEERING PROGRAMS

2022 ACADEMIC YEAR



TRAINING
IMAGINATION
ENTREPRENEURSHIP

TÉLÉCOM PARIS, A GRADUATE SCHOOL...

... CONNECTED TO

CENTERS OF EXCELLENCE

TÉLÉCOM PARIS
IS PART OF:



TÉLÉCOM PARIS IS ...

> **A founding member of Institut Polytechnique de Paris**, a world-class science and technology institute composed of five graduate schools: École Polytechnique, ENSTA Paris, ENSAE Paris, Télécom Paris and Télécom SudParis; and a key partnership with HEC. This internationally-oriented group develops cutting-edge scientific research and offers programs with the highest standards of excellence for all degree levels. It also ensures excellent employability for graduates.

> **An IMT school (Institut Mines-Télécom)**, 1st group of public engineering and management schools dedicated to higher education and research for innovation in France. IMT conducts its activities throughout France at thirteen graduate schools and trains 13,000 engineers, managers and PhDs. IMT has partnerships with the best institutions and companies in France and abroad through alliances and agreements, and two Carnot label institutes.



A HUMAN SCALE SCHOOL

820 student Engineers

525 specialized Master's students

210 doctoral students

18,300 graduates



AN INTERNATIONAL OUTLOOK

100 partnerships in **39** countries, including

45 dual degrees

45 Erasmus programs

45% international students

1 international campus in Shanghai: Paris Shanghai Jiao Tong (SPEIT)



CUTTING-EDGE RESEARCH

154 research and faculty members and permanent researchers

600 international publications

12 active patents for the current year

22 teaching & research chairs and laboratories with corporate funding

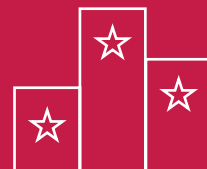


BUSINESS CREATION

+ de 500 companies started since 1999, 86% of which are still active

3 start-ups created each month

+ 5,000 jobs created
€685 M raised from financial partners since 2015



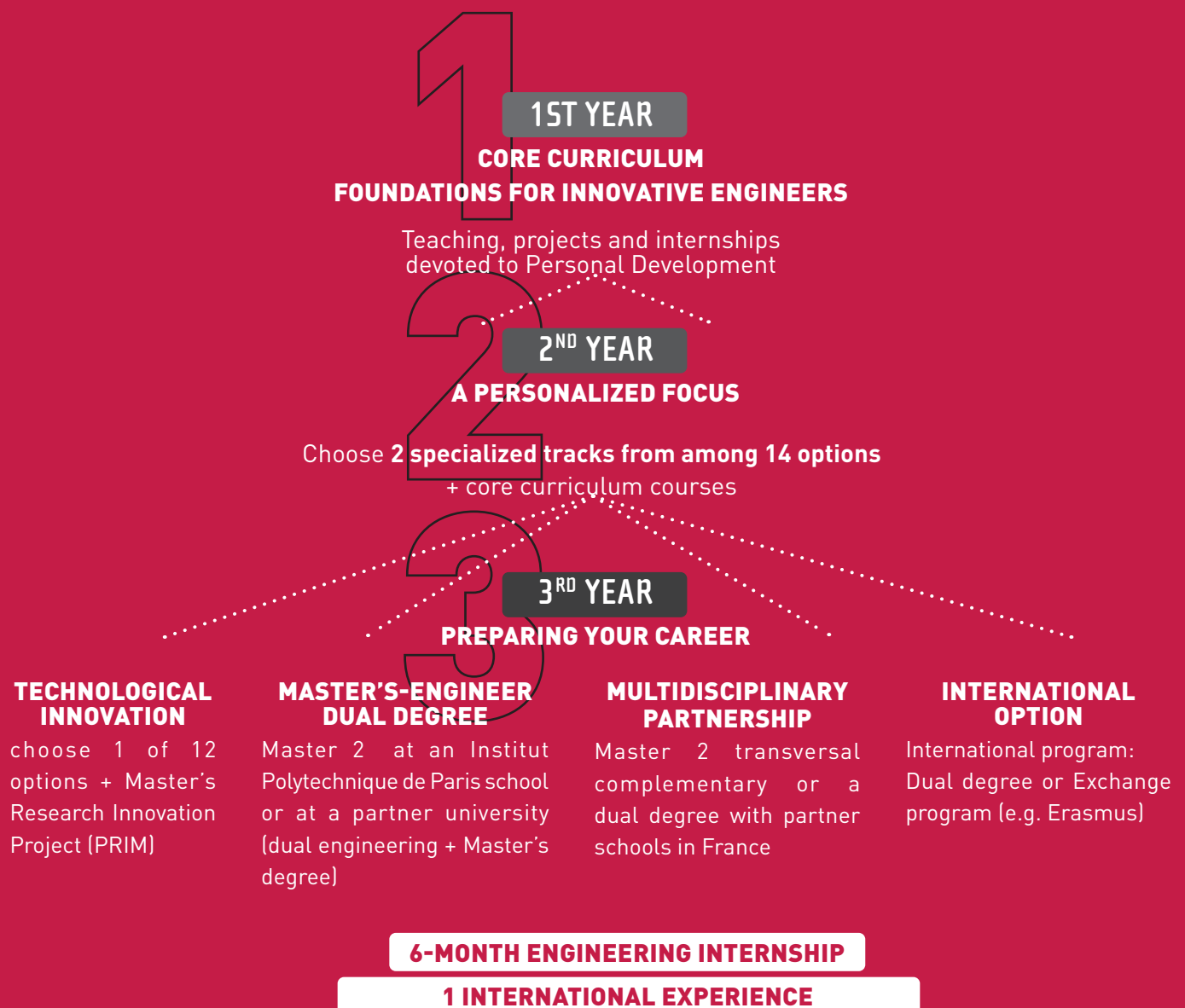
TOP RANKINGS

2nd overall (*L'Étudiant*)

Number 1 for digital schools (*Le Figaro*)

5th best French institution (*International Times Higher Education World Rankings*)

GENERAL ENGINEER TRAINING AT TÉLÉCOM PARIS



YOUR 1ST YEAR AT TÉLÉCOM PARIS: A NEW APPROACH TO TEACHING

The 1st year program is composed of some twenty core curriculum courses, projects chosen by students and cross-disciplinary teaching. By the end of the 1st year, students will be prepared to choose the fields they wish to pursue in their 2nd year.

CORE TEACHING FOR ALL STUDENTS

• Applied Mathematics and Digital Communications

Analysis (40 hrs)

Probability and statistics (45 hrs)

Digital communications and information theory (30 hrs)

Tools and applications for the signal, images and sound (46 hrs)

• Basic Concepts of Physics and Electronics

Optics and photonics (30 hrs)

Propagation (30 hrs)

Micro- and nanophysics (30 hrs)

Electronics of acquisition systems (29 hrs)

Digital processors and architectures (46 hrs)

• Computer Science

Data structures and algorithms (30 hrs)

Java language (42 hrs)

Operating systems and C language (48 hrs)

Language theory (18 hrs)

Networks (27 hrs)

• Economic, Social and Human Sciences

Introduction to economics (18 hrs)

Management and administration (15 hrs)

Technologies & society (22 hrs)

Practices and analysis of written communication (22 hrs)

• Discovering the Business World

To gain an understanding of the role and activities of digital engineers

Company visits (8 hrs)

Conference series on "Discovering digital engineering professions" (12 hrs)

THE PROJECTS

• Thematic collaborative learning project - PACT

(approximately 100 hours)

By adopting a new approach to learning, prioritizing creativity and autonomy, the PACT project addresses tangible corporate needs while helping you learn to investigate.

Team work, project management, perceiving the complexities of real problems; each group of students chooses a subject at the start of the year and are assisted by a tutor during the six months of the project.

• Final implementation project - PAF

(approximately 45 hours)

This project allows students to apply what they have learned during their first year by creating a tangible product incorporating hardware and software and integrating at least two technical disciplines. It helps students choose the focus for their Master's program by providing a glimpse of the potential of the various disciplines offered.

THE ELECTIVES

• Language courses

English + one or two languages from among 10 choices, as a beginner or intermediate learner

• Contemporary Humanities courses

• Personal development courses (theater, improvisation, etc.).

THE PERSONAL DEVELOPMENT INTERNSHIP

This 1-2-month summer internship at the end of your first year allows you to gain life experience with a company or organization. The choice of internship is open and can be completed in France or abroad.

YOUR 2ND YEAR AT TÉLÉCOM PARIS

MASTER 2 SPECIALIZED TRACKS AND FIELDS OF APPLICATION

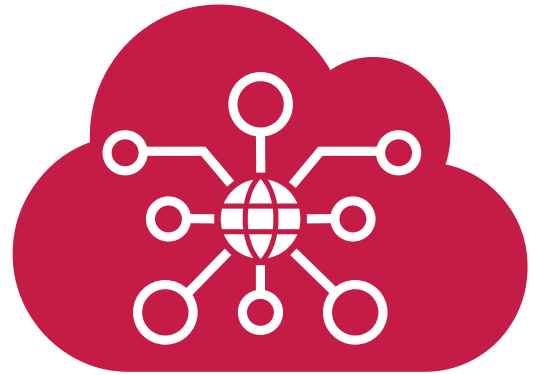
2nd year teaching is organized into Teaching Units (TU). You will choose 2 tracks from among the 14 propositions (192 hours of courses per specialized track), to which you will add courses in the social sciences (85 hours), languages (30-60 hours) and personal and professional training activities (30 hours).

2ND YEAR TRAINING

- Two specialized tracks (40 ECTS credits) from among the 14 propositions. Certain propositions include different options.
- 8 complementary courses (20 ECTS credits) in the economic, human and social sciences.
- Language courses (4 ECTS credits per semester).
- Personal and professional training courses (3 ECTS credits per year) from a wide range of choices.

A PROGRAM IN ENGLISH

During your 2nd and 3rd years, you have the option of completing your studies in English. You will complete two specialized tracks selected from among Distributed Software Systems, Random Modeling & Scientific Computing, Data Science, Markets-Organization-Data-Strategy and Signal Processing for Artificial Intelligence, complemented by a choice of human and social sciences, all offered in English.



THE 14 SPECIALIZED TRACKS

(see details on following pages)

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

- Data science
- Signal processing for artificial intelligence
- Image

MATHEMATICS AND COMPUTER SCIENCE

- Random modeling and scientific computing
- Applied algebra
- Mathematics, theoretical computer science and operational research

ECONOMY AND DIGITAL INNOVATIONS

- Markets-Organization-Data-Strategy

NETWORKS, COMMUNICATIONS AND CYBERSECURITY

- Large digital infrastructure
- Mobile networks and the Internet of Things
- Computer network and infrastructure security
- Telecommunications: data for systems

COMPUTER, INTERACTIVE AND EMBEDDED SYSTEMS

- Embedded systems
- Distributed software systems
- 3D and interactive systems

DATA SCIENCE (SD)



For those who love

- Applied mathematics
- Working on (very) recent topics



The Data Science track will be taught in English.

Objectives

The Data Science track covers all aspects related to the exploitation, management and analysis of structured and unstructured data.

In practice

The course combines theoretical and practical components, ensuring a good balance of math seminars and practical work in the computer room. You will increase your knowledge of databases, web development, statistics and statistical learning.

Professions

Career opportunities include data scientist or analyst, statistical engineer, database administrator, or careers in research and R&D in statistical learning, data management, data extraction, data mining, and learning mathematics.

3rd year technological innovation at the School

- Data science
- Artificial Intelligence

Master's-Engineering Dual Degree

Learning option:

- Mathematics, Vision, Learning (IP Paris/Univ. Paris-Saclay)
- Data Science (IP Paris)
- Data and Artificial Intelligence (IP Paris)

Data management option:

- Data and Artificial Intelligence (IP Paris)
- DataScale: Data management in a digital world (University of Paris-Saclay)



Olivia HENNEQUIN,
class of 2022



This track combines computer science and mathematics to teach us how to exploit databases. It features theoretical and practical courses (conducted entirely using Python and SQL), as well as group projects. These projects allow us to apply all our knowledge in the subjects of our choice and learn teamwork in a work setting. In practical terms, the SD track perfectly complements a wide range of other tracks by providing both a general view of data as well as a more technical perspective in terms of data processing and exploitation.

This track plays a key role in numerous research projects and is therefore chosen by the largest group of students.

During the third year, it also offers the opportunity to participate in exchange and dual degree programs around the world. This provides students with a wide range of choices for continuing their studies in France or abroad. This track offers numerous career opportunities in cutting-edge sectors.



Head: François Portier and Mauro Sozio
Head of international mobility: Stéphan Cléménçon
Internship coordination: Pavlo Mozharovskyi

SIGNAL PROCESSING FOR

ARTIFICIAL INTELLIGENCE (TSIA)

For those who love

- Math applied to practical problems
- Statistical learning
- Signal processing



THE TSIA courses will be taught in English.

Objectives

Upon completion of this track, students will have a broad and operational perspective of statistical learning and signal processing. They will understand the issues surrounding data processing and *big data*, the methodological foundations (statistics, optimization) and techniques for processing temporal data in particular (signal processing).

In practice

The teaching prioritizes rigorous lectures and practical work in realistic conditions.

Professions

The track trains future engineers who will have a wide range of skills in the area of statistical learning (*machine learning*) and signal processing, which cover numerous fields of application: music and speech, biosignals, radio astronomy, transmission and compression of multimedia information, etc.

3rd year technological innovation at the School

- Data science
- Artificial Intelligence

Master's-Engineering Dual Degree

- Automation and Signal and Image Processing (University of Paris-Saclay)
- Data and Artificial Intelligence (IP Paris)
- Data Science (IP Paris)
- Mathematics, Vision, Learning (IP Paris/Univ. Paris-Saclay)
- Acoustics, signal processing and computer science applied to music (Sorbonne University)
- Bio-Imaging (Université Paris-Descartes, Biomedical specification)

Yukun LIU,
class of 2022



TSIA associates the knowledge from broad subjects, and these subjects are all explored step by step. For one example, the path of learning for machine learning is from Hilbert space to SVM, to perception, along to neural network. And this helps build solid foundations in the expertise. TSIA connects theory tightly with practice. Each course contains two or three practical works, and it's always fascinating to learn the theories, implement them and witness their functionality in practical works (when they work).



Head: Roland Badeau

Head of international mobility: Giovanna Varni

Internship coordination: Eric Fenaux

IMAGE



Objectives

This track ensures solid knowledge in image processing and interpretation, which is valuable in industrial pursuits as well as in research laboratories for those pursuing a PhD.

In practice

This track allows students to acquire the fundamentals of image analysis and then discover more advanced courses on mathematical and image techniques, computer vision and 3D reconstruction, approaches inspired by artificial intelligence, particularly deep learning, for image analysis and interpretation, image classification and indexing, and video. The main fields of application (medical imaging, aerial and satellite imaging and consumer photography) will be presented by current researchers in these fields and supplemented by presentations by industrial stakeholders on other applications (biometrics, industrial vision, etc.).

Professions

This helps students prepare for research engineer positions and research on image processing and interpretation studies, vision and 3D in a wide range of fields: medical and biological imaging, consumer photography, scene modeling and synthesis, spatial and aerial imaging, spatial and aerial imaging, biometrics, defense, etc.

Managers: Yann Gousseau and Florence Tupin

Head of international mobility:

Yann Gousseau and Florence Tupin

Internship coordination: Michel Roux

For those who love

- Images
- Digital photography
- Mathematics and algorithms
- Automated learning applications



3rd year technological innovation at the School

- Image
- Artificial Intelligence

Master's-Engineering Dual Degree

- Image (Sorbonne Université)
- Mathematics, Vision, Learning (IP Paris/Univ. Paris-Saclay)
- Health Engineering: Bioimaging track (University of Paris-Descartes)
- Automation and Image and Signal Processing Images (University of Paris-Saclay)
- Physical Remote Sensing Methods (Sorbonne University)
- Data and Artificial Intelligence (IP Paris)

Clara TEISSIER,
class of 2023



I really appreciated the practical aspect of the IMA track: there are a lot of practical sessions and projects each period to help us apply the image processing methods studies presented in class. It works well in combination with more theoretical tracks.

It offers a broad perspective of image processing, both with and without machine learning, and on the different fields of application: medical, satellite imaging...

The projects then allow us to further enhance our knowledge and learn to look for ourselves in research articles for more advanced methods than those presented in class.

RANDOM MODELING

AND SCIENTIFIC COMPUTING (MACS)

The MACS track will be taught in English.

Objectives

The MACS track provides training in applied mathematics, specifically in the fields of random modeling and scientific computing for applications (according to choice) in financial mathematics, data science, modeling and signal and image processing.

In practice

In MACS, we take an in-depth look at mathematical tools for statistics, scientific computing and financial mathematics. The theoretical approach is similar to that of a preparatory class, with seminars and practical sessions completed in R. The Masters 2 completed thereafter often focuses on probability, finance or statistics.

Professions

Technology companies and the financial industry particularly appreciate dual degrees from this Master's program. This type of program opens vast opportunities for PhD students to pursue an academic thesis or an industrial project (CIFRE thesis).

Manager: François Roueff
Head of international mobility: Anne Sabourin
Internship coordination: Laurent Decreusefond

For those who love

- Probability
- Data analysis
- Mathematics and applications (in finance, data science, etc.)



3rd year technological innovation at the School

- Random modeling and scientific computing

Master's-Engineering Dual Degree

- Random modeling, finance and data science (University of Paris-Diderot)
- Probability & Finance (IP Paris)
- Data Science (IP Paris)
- Statistics, Finance and actuarial science (IP Paris)
- Mathematics of randomness (IP Paris)
- Mathematics, Vision, Learning (IP Paris/Univ. Paris-Saclay)

Anna VAN ELST,
class of 2023



MACS is an excellent track for those who love probability and theoretical mathematics. It covers all the key probability concepts: mathematical statistics, stochastic calculus, modes of convergence, and martingales.

I especially appreciated the quality of the demonstrations and the diversity of the mathematical reasoning. In addition, this track helped me understand the tools used in data science and mathematical finance.

The MACS track also paves the way for excellent opportunities in the best applied mathematics Master's programs (Probability & Finance, Mathematics, Vision, Learning-MVA...).

APPLIED ALGEBRA

Cryptography, quantum information, coding



The ACCQ track will be taught in English.

Objectives

This track offers an introduction to several IT and telecommunication fields: formal calculation, correction coding, cryptography and quantum information theory. This track is primarily based on core mathematical foundations, especially algebraic concepts.

In practice

These areas are first examined from a theoretical perspective. This includes purely mathematical courses (arithmetic, finite fields, algebraic curves) and courses combining computer science and mathematics or even physics (correction coding, cryptography, quantum information). The modules are taught in traditional lesson-seminar form, with around fifteen students per class. Certain modules can also take the form of projects or practical sessions on machines (computational algebra).

Professions

This track opens the door to research, with the most natural next steps being a Master 2 followed by a thesis. However, it could also provide helpful theoretical insight for students who wish to pursue a career as an engineer specializing in communication systems networks or security.

Managers: Aslan Tchamkerten
Head of international mobility: Michèle Wigger
Internship coordination: Ghaya Rekaya

For those who love

- Algebra
- Mathematics in general, and are not afraid of abstraction



3rd year technological innovation at the School

- Quantum Engineering

Master's-Engineering Dual Degree

- Machine Learning, Communications, and Security (IP Paris)
- Algorithmics and Foundations of Programming, formerly Master Parisien de Recherche en Informatique (Université Paris-Saclay)

Vincent MOREAU,
class of 2021



The Applied Algebra (ACCQ) track provides high-level mathematical training on a wide range of topics, such as cryptography, algebraic geometry and quantum information. Combining the study of basic mathematics with the most recent applications, ACCQ allows students to pursue opportunities in the academic world as well as in prestigious corporate R&D departments.

With less than fifteen students and an excellent faculty members, ACCQ is a flagship Télécom track. It's the ideal choice for those who wish to continue their algebra studies after their entrance exams!

MATHEMATICS, THEORETICAL COMPUTER SCIENCE AND OPERATIONAL RESEARCH

This track is designed for students seeking advanced training focused at the interface between computer science and mathematics. It is especially recommended for those who wish to pursue a PhD in Computer Science.

Objectives

The track equips future engineers with the tools they need to analyze and solve difficult mathematical and algorithmic problems using a variety of approaches.

In practice

The program combines classes presenting methods of combinatorial optimization, advanced algorithms, game theory, graph theory or distributed computing with teaching units that provide an understanding of the limits and the ins and outs of programming by means of computability and logic.

Professions

This track trains minds that will be ready to overcome the challenges facing the big names in IT and in every sector (transport, energy, logistics, banks, health telecommunications). It paves the way for career opportunities in research and experts in the corporate world, from innovative start-ups to large companies.

Head: Bertrand Meyer

Head of international mobility: Petr Kuznetsov and Jean Leneutre

Internship coordination: Bertrand Meyer

For those who love

- Solving mathematical problems with original approaches
- Understanding the possibilities and limits of computer science



3rd year technological innovation at the School

- Quantum Engineering

Master's-Engineering Dual Degree

- Algorithmics and Foundations of Programming, formerly Master Parisien de Recherche en Informatique (University of Paris-Saclay)
- Operational Research (University of Paris-Saclay)

Paul VEZIA,
class of 2022



All those who love mathematics and theoretical computer science will be fascinated by the various courses taught in the MITRO track.

From game theory to the complexity of the algorithms, the various courses in this track are very different from each other, and yet complementary. MITRO is a perfect match for students who enjoy reflecting on and solving complex problems, since the exercises in the different courses are similar to puzzle-solving.

There are generally around twenty people enrolled in this track, which results in a close-knit class with a sense of solidarity and special connections with the various professors.

Students gain recognized skills that will allow them to continue their studies in theoretical research, but they can also be applied to the business world. The professors, recognized experts in their fields, are available to help students and are skilled teachers.

MARKETS, ORGANIZATION

DATA, STRATEGY



The MODS courses will be partly taught in English.

Objectives

The MODS track helps students understand how markets and corporate strategies work and the impacts of digital technology and sustainable development on the organization of companies and digital platforms, business models and corporate information systems and innovations. It also introduces them to the qualitative and quantitative tools used in the Social and Economic Sciences.

In practice

The MODS track offers multidisciplinary and complementary courses (Management, Economics, Law/Ethics, Sociology) that provide a broad understanding of the issues involved in the modern digital transformation.

It aims to train engineers who will be able to transform society and innovate by creating business models that take into account new environmental and social approaches as well as ethics.

These courses will increase your theoretical knowledge while also putting it into practice through business cases, mini projects in class, and projects with companies, start-ups, organizations and outside experts.

Professions

Strategic or IT consulting, marketing, finance or technological product and service development.

Head: Myriam Davidovici

Head of international mobility:

Lukasz Grzybowski

Internship coordination: Dana Diminescu

For those who love



- Understanding recent issues related to responsible and sustainable digital transformation
- Discovering socio-economic methods for data analysis

3rd year technological innovation at the School

- Management, Innovation, Digital option (with Sciences Po)

Master's-Engineering Dual Degree

- Network Industries and Digital Economy (IP Paris)
- Design Innovation Project (IP Paris)

International option

- Master of Science in Management and Technology, Master of Science in Economics (LSE, Berkeley, Columbia, MIT)

Paul FRAMBOT,
class of 2022



The MODS track offers courses on responsible digital transformation and introduces us to digital management projects while keeping social, ethical and environmental factors in mind...

We directly apply the concepts learned in class through very interesting corporate projects.

For example, we worked in a group of three with Air France for six months to develop 5G applications for Paris-Charles de Gaulle airport. I also worked on the socioeconomic issues affecting the CityTaps start-up, which develops connected water meters in Africa.

We learned a lot about the organization and strategies of start-ups and large companies.

LARGE DIGITAL

INFRASTRUCTURE (GIN)

Objectives

The GIN track provides students with a comprehensive picture of the stakeholders, architecture and technology involved in large digital infrastructure. This track seamlessly integrates various components (cloud, fixed and mobile networks, security), that could each be pursued through specialized courses.

In practice

The GIN track is designed to give students an overview of the various stakeholders involved in large digital infrastructure, their interactions and underlying technologies: content distribution (video and web), cloud service providers, internet service providers and operators, campus/corporate networks, access networks (fixed and mobile, IoT) and final users. The approach is both technical, integrating architecture and protocol aspects, and techno-economic (issues, interactions between the stakeholders and friction points). Security issues are also addressed. The goal is not only to understand current and future technology, but also to understand the reasons behind these changes.

Professions

This track opens the door to a wide range of opportunities, given the important role of large digital infrastructure in our economy and society. A variety of companies are involved: start-ups, specialized small and medium-sized companies (e.g. content distribution, specialized software publisher), large national groups ("sovereign" networks and cloud) and international groups (equipment manufacturers and service providers).

Heads: Jean-Louis Rougier

Head of international mobility:

Jean-Louis Rougier

Internship coordination: Jean-Louis Rougier

For those who love

- Understanding the various stakeholders involved in large digital infrastructure and their interactions
- Understanding the technologies used and their development



Possible careers include:

- Pre-sales architect and engineer
- Consultant (SS2I, integrators)
- Customer manager (operators, service providers)
- Project manager/Product manager
- Research engineer (builders, service providers)
- PhD (academic laboratory or industrial)
- Business creation (start-up, etc.)

3rd year technological innovation at the School

- Large digital infrastructure
- Computer network and infrastructure security

Master's-Engineering Dual Degree

- Optic Networks Photonic Systems (IP Paris)

Alexandra DENIAUD,
class of 2022



This track provided me with an excellent balance between theory and practice. But above all, it gave me an overview of how digital exchanges work. This is a brand new track and the professors are really attentive to what we would like to see and how we would like to work.



MOBILE NETWORKS

AND THE INTERNET OF THINGS (RIO)



The RIO track offers advanced training on mobile networks and the Internet of Things. While cellular networks completely changed our modes of communication, the Internet of Things (IoT) is expected to revolutionize health, industry, transport, cities and leisure activities. Mobile networks and IoT are therefore the two key components of the future fifth generation.

Objectives

The track therefore aims to train engineers with an excellent knowledge of existing technology and the capacity to design networks of the future.

In practice

The track offers a good balance between the general principles of wireless networks, technological aspects (standards, protocols, architecture, including for mobile cloud), platform tests, theoretical aspects (stochastic modeling for performance assessment and optimization) and a look at the current challenges.

Professions

The RIO track is designed to train consultants, network architects, design engineers employed by operators, as well as by energy suppliers, intelligent car manufacturers, and in the e-health sector. Students will also have the possibility of working for start-ups in the Internet of Things or to pursue research or teaching activities.

Head: Anaïs Vergne

Head of international mobility:

Marceau Coupechoux

Internship coordination: Sawsan Al Zahr

For those who love



- Discovering the world of the Internet of Things
- Understanding how our smartphones communicate
- Understanding the issues pertaining to IoT operators and stakeholders

3rd year technological innovation at the School

- Large Digital Infrastructure

Master's-Engineering Dual Degree

- Optic Networks Photonic Systems (IP Paris)
- Computer Science for Network (IP Paris)

**Innimei
TIROUMALECHETTY,
Class of 2022**



The RIO track focuses on three themes: mobile networks, the Internet of Things and mobile cloud. We study the various wireless technologies in depth, from their historical development to the way they currently operate. The track is designed to allow us to build a solid knowledge base between gradually advancing towards modern applications. For example, we start by studying a 2G network and end with a 5G network and tools that enable the configuration and optimization of a wireless network.

We have practical sessions and/or projects on each theme that allow us to put our knowledge into practice. For the mobile network component, we primarily perform analyses on radio frames. We also complete a group project on an IoT application. We also complete practical virtualization work and analyze scientific articles that provide a better understanding of the significance of cloud technology.

COMPUTER NETWORK AND

INFRASTRUCTURE SECURITY (SR2I)

For those who love

- Thinking about a system and changing its use
- All aspects of cybersecurity
- Cryptographic challenges
- Networks of the future and critical infrastructure
- Electronic payment and embedded systems



Objectives

The SR2I track trains engineers to become highly qualified in Cybersecurity, with a mastery of the technical, organizational and legal aspects involved in computer infrastructure and networks throughout their various transformations in order to manage the associated risks.

In practice

This means:

- mastering the various security services and their cryptographic mechanisms;
- knowing how to assess risks, threats and consequences;
- mastering the analysis and implementation of attacks;
- mastering analysis and audit tools;
- mastering techniques for developing secure applications and protocols;
- implementing trusted infrastructure.

Theoretical teaching consolidated by practical training in a variety of forms (workshops, practical sessions, group projects, individual projects) allows students to master the concepts and tools.

Professions

The SR2I trains engineers in communication systems, networks and security.

3rd year technological innovation at the School

- Computer network and infrastructure security



Bastien MORANTIN,
class of 2023

For my second year of engineering school, I chose the SR2I track because it trains us to respond to new security issues in the digital world.

Security has become crucial to all of our computer systems, and in this track we learn about the key parts of a secure system, and how to analyze and improve them.

In class, we address various aspects of security and study a wide range technical solutions, thanks in particular to projects and practical exercises.

I have always been fascinated by computer science and I therefore selected the Embedded Systems (SE) track: the two go well together, which will allow me to work on every aspect of a project during my future missions.



Head: Ahmed Serhrouchni

Head of international mobility: Rida Khatoun

Internship coordination: Pascal Urien

TELECOMMUNICATIONS:

DATA FOR SYSTEMS



Objectives

This track provides both a comprehensive and global view of communication network technology, from both a theoretical and practical perspective.

In practice

One of the strengths of the track is the main project, which creates a central theme that follows students throughout the year, helping them better understand the concept of communication systems by making connections between the different Teaching Units.

More specifically, students study digital communications, optical communications, antennas and the associated wireless electronic communication systems and their interactions in order to gain a start to finish view of a communication network.

Professions

Upon completing this track, you will have a comprehensive and multidisciplinary view of communication systems. The 3rd year will allow you to further explore one of the areas presented in the track.

You will then be prepared to join a major company, SME or an innovative start-up from a wide range of sectors, from telecoms to aeronautics, and the automotive and health industries... Your training will also be of interest to technology consultancy firms. It is also possible to continue on to an industrial or academic thesis.

Head: Anne-Claire Lepage

Head of international mobility: Michèle Wigger

Internship coordination: Anne-Claire Lepage

For those who love

- Understanding the architecture of a communication system
- Understanding how data is transferred
- Understanding how a laser or antenna works



3rd year technological innovation at the School

- Integration circuits systems and communicating objects

Master's-Engineering Dual Degree

from Institut Polytechnique de Paris:

- Integration Circuits Systems
- Optic Networks Photonic Systems
- Radio Systems

Joe Ing LEE,
class of 2022



After my first year, which allowed me to discover the wide range of fields involved in digital technology, I chose to specialize in telecommunication, which is of course a subject that this school truly masters.

Despite being a specialized track, a variety of topics are studied, from wave propagation to quantum optics and communication theory.

Students acquire a firm theoretical knowledge base throughout the year, but the practical focus remains key. The track features a project that connects all the topics and allows students to understand the real applications and practical challenges.

EMBEDDED SYSTEMS (SE)

For those who love

- Understanding interactions between hardware and software without leaving any gray areas
- Both practical and theoretical learning



Objectives

This track trains engineers with in-depth theoretical and practical knowledge in the area of embedded systems.

In practice

The theoretical teaching is complemented and further explored through numerous practical activities and projects. The topics discussed cover a wide range, from hardware (hardware description languages, reconfigurable architectures, runtime support) to the software aspects (programming a microprocessor system, compilation, concurrent computing) and also include modeling.

Professions

It offers career opportunities in a wide range of industrial sectors: transport, telecommunications, space, nuclear energy, robotics, defense, consumer electronics, etc.

This track also prepares students for several Master 2 programs.

3rd year technological innovation at the School

- Embedded systems

Master's-Engineering Dual Degree

- Integration Circuits Systems (IP Paris)
- Embedded Systems and Information Processing (IP Paris)
- Distributed Systems and Applications (Sorbonne University)



Sami TENDJAoui,
class of 2023



The SE track was the ideal choice for me. It is the perfect track for those who want to fully understand the internal operations of digital systems, from a computer program written in C or in Rust to the architecture of a processor that runs it, to the design of electronic circuits on FPGA. All of the concepts presented in class are immediately applied through practical workshops and projects.

This track requires investment, but the team of faculty is also very committed to helping students and are always available to answer our questions. The SE class sizes are small, which allows us to help each other more easily.



Head: Guillaume Duc
Head of international mobility: Maria Mushtaq
Internship coordination: Tarik Graba

DISTRIBUTED SOFTWARE SYSTEMS (SLR)



Distributed Software Systems courses will be taught in English.

Objectives

The track offers an overview of theoretical foundations, structural models, solutions, practices and methods used by the architects and designer-developers of software and distributed systems. The goal is to help students acquire practical knowledge that will allow them to better understand in-house engineering.

In practice

The issues addressed range from distribution to design, verification and validation, development life cycle and are supplemented with new fields of application.

Professions

The SLR track aims to train specialists in computer science thanks to their skills in three key areas: advanced technologies in distributed systems, new development and deployment methods for software solutions, and business processes.

Professions include:

- Architect or urban planner for distributed systems,
- Software engineer - development of systems and services,
- Integration engineer,
- Consultant,
- Project manager...

Heads: Petr Kuznetsov and Rémi Sharrock

Head of international mobility:

Petr Kuznetsov

Internship coordination: Petr Kuznetsov

For those who love

- Designing computer systems
- Perceiving trends in current systems
- Implementation through practical work



3rd year technological innovation at the School

- Advanced distributed software systems

Master's-Engineering Dual Degree

- Distributed and parallel systems (IP Paris)
- Algorithms and Foundations of Programming, formerly Master Parisien de Recherche en Informatique (University of Paris-Saclay)

Adrien BOITREAUD,
class of 2023



The SLR track provides an understanding of how current large computer systems work.

It offers a good balance of theory and practice. The theoretical aspect addresses distributed algorithms, including the foundations of blockchain and the development of software testing methods.

For the practical component, several projects are spread throughout the year to help students gain experience in Java by deploying systems integrating several machines or threads for distributed computing, for example.

In short, this track is ideal for those who wish to continue to code during their second year and discover computer concepts used in large-scale applications.

3D AND INTERACTIVE SYSTEMS

For those who love

- 3D design and virtual reality
- Interactive devices and systems
- Tactile, mobile and gesture interfaces
- Video games and special effects



Objectives

This track aims to provide students with comprehensive training in the areas of human-machine interaction and 3D computer graphics. It prepares students to become engineers working on the design of advanced interactive systems by offering them the foundations they need in computer science and mathematics in order to complete the digital monitoring of these systems.

In practice

You will learn how to develop interactive 2D and 3D applications for mobile tools and the web. You will also try your hand at 3D computer graphics and virtual reality and develop the project of your choice during the dedicated seminars.

Professions

Career opportunities for this track include: computer-aided design (CAD), video games, special effects, mobile applications, simulation, interaction design, virtual reality and visualization. This track prepares students for scientific professions related to research and human-machine interactions (HMI) or in 3D computer graphics, with the possibility of going on to complete a specialized Master 2 degree in one of these two fields.

3rd year technological innovation at the School

- 3D and interactive systems

Master's-Engineering Dual Degree

- Image (Sorbonne University)
- Interaction, Graphics & Design (IP)
- Mathematics, Vision, Learning (IP Paris/Univ. Paris-Saclay)

Arthur LAMBERT,
class of 2022



I believe that this track covers a wider range of courses than the others: from HTML for web development to HMI design, to 3D graphic design and visualization, there is truly something for everyone.

All these areas have one point in common: the role of creative freedom and visual arts, which is what made me choose this track.

The variety of practical activities and projects also offers a very stimulating and satisfying aspect because they allow us to obtain the finished product of something we chose and designed ourselves (design of an interactive restaurant terminal, modeling of erosion in 3D, or an interactive presentation tool). This allows us to learn more than we would in a purely theoretical class!

Heads: Eric Lecolinet and Kiwon Um
Head of international mobility: James Eagan

PERSONAL DEVELOPMENT TRAINING, GENERAL KNOWLEDGE,

ECONOMIC AND SOCIAL SCIENCE COURSES

Because Télécom Paris engineers must understand how digital technology transforms economies and societies, you will receive training in economics, law, the sociology of digital technology, general knowledge, management and languages.

You will therefore complete a Teaching Unit (TU) on economics and management, information and communication, design and sociology, contemporary humanities, law and entrepreneurship. You can complement your training with elective courses in science and technology. The Optimization course and certain scientific TU are mandatory depending on the specialized track.

SCIENCE AND TECHNOLOGY

- Foundations of machine learning
- Databases
- Queues
- Technological innovation
- Optimization
- Programming paradigms, theory and practices
- Preparation for programming entrance exams
- Statistics
- Web Development
- Machine Learning

HUMAN AND SOCIAL SCIENCES

- Digital economy
- Digital Management
- Internet and Society
- Cultural industries and digital technology: creation to uses
- Cinema, society and management
- Sociology of Big Data
- Interaction Design
- Sociology of digital technology
- Responsible innovation
- Digital marketing
- Corporate finance

CONTEMPORARY HUMANITIES

- Opera - musicology
- Architecture
- Philosophy of science
- Philosophy
- Art history
- Political sciences

PERSONAL DEVELOPMENT

- Build on your diversity to become tomorrow's leader
- Learn to see through the fine arts
- Video creation workshop
- Communication for non-French speakers
- Leading negotiation
- Cultivating your relational intelligence
- Creative CV
- Becoming the entrepreneur of my project
- Dialogue on diversity
- Building self-confidence and trust with others
- Humor in work relations
- Societal impact and equal opportunities: taking action for tomorrow's world
- Emotional intelligence: tools for understanding the world
- The human voice and its issues
- The circle of eloquence
- Stress, a driver or hindrance?
- Leadership and cooperation: the map of balance
- Life Design
- Managing Communication in an International Context
- Leading a discussion to establish an agreement
- Better self-knowledge to become the leader of your future
- Teamwork in an organization
- Lasting happiness at work?
- Comparative international law
- Labor law
- Psychoanalysis
- Humanities
- Information technology and communication law
- Sociology of humanity

YOUR 3RD YEAR AT TÉLÉCOM PARIS

As 3rd year students at Télécom Paris, you can choose a field of specialization. The year is divided into six months of classes and a six-month engineer internship. You may choose from the following options:

TECHNOLOGICAL INNOVATION

In keeping with your 2nd year, you may take the so-called “in-house” Technological Innovation option at Télécom Paris for one semester. In addition to the teaching included in this option, you will complete a Master’s Research Innovation Project: a true learning experience in innovation, taking on challenges from the corporate world or research labs.

MASTER’S-ENGINEERING DUAL DEGREE

You may choose to complete a Master 2 degree offered by many partner universities. This will allow you to earn the Télécom Paris dual degree and a Master’s degree from the partner university.

MULTIDISCIPLINARY PARTNERSHIP

This option offers complementary training that breaks with the traditional second-year program. You may choose a complementary program at the School or opt for a dual degree from one of the Télécom Paris partner universities, such as HEC, Sciences Po, ENSAE Paris, or ENS Lyon.

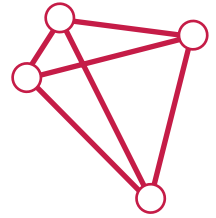
INTERNATIONAL OPTION

The international option takes the form of an Erasmus stay or a dual degree program. In this case, you will earn the Télécom Paris dual degree and a Master’s degree from the partner university.



TECHNOLOGICAL INNOVATION

AT TÉLÉCOM PARIS



The in-house option continues on from the 2nd year studies. You can choose one of 12 options to pursue by taking 120 course hours. These courses are complemented by a Master's Research Innovation Project, which is completed during the semester on a part-time basis.

THE 12 OPTIONS FOR 3RD YEAR STUDENTS

- > 3D and Interactive Systems
- > Image
- > Integration circuits systems and communicating objects
- > Artificial Intelligence in partnership with ENSTA Paris
- > Management, Innovation, Digital Technology in partnership with SciencesPo
- > Random modeling and scientific computing
- > Quantum engineering
- > Large digital infrastructure
- > Data science
- > Embedded systems
- > Computer network and infrastructure security
- > Advanced distributed software systems

MASTER'S RESEARCH INNOVATION PROJECT (PRIM)

The PRIM is an innovation training program. You will complete this project independently over the course of one semester.

This will immerse you in real-life projects proposed by partner companies and the school's research laboratories related to new innovation issues. You can also suggest a topic you have already started to work on and wish to explore further, or propose an entrepreneurial topic and be supervised by management professor Thomas Houy.

This project is also enriched by complementary training on key innovation skills. The goal is to be prepared to pursue research, innovation and entrepreneurship in a digital world.

A few recent PRIM examples:

- E. Orisni - Graph compression by clique overlap
- H. Braun - Aggregating and finding common structure between k strings
- A. Delaunay - Matching products in images using AI techniques
- L. de Freitas Smaira - Automatic feature creation and its impacts on predictions
- C. Rydhal - Setting up a mobile app and launching the marketing



MASTER'S-ENGINEER

DUAL DEGREE

Télécom Paris works closely with other engineering schools and universities to design training programs and Master's degrees.

These Master's degrees are recommended by Télécom Paris professors as a 3rd year specialization option, just like certain in-house options.

2nd year students in the engineering program can apply to the Master's degrees listed on the right. Students enter the 2nd year of the Master's program directly, which will earn them a dual degree.

Institut Polytechnique de Paris also offers Master's programs, including 7 run by Télécom Paris:

- > Integration, Circuits & Systems (ICS)
- > Information Processing: Machine Learning, Communications and Security (MICAS)
- > Embedded Systems and Information Processing (SETI)
- > Data & Artificial Intelligence
- > Interaction, Graphics & Design (IGD)
- > Mathematics, Vision, Learning (MVA)
- > Design Research

All programs offered by Institut Polytechnique de Paris are available on www.ip-paris.fr



Master's in Design (co-accreditation with Univ. Paris-Saclay):

M2 Design Research

Master's in Electronics, Electric Energy, Automation (co-accreditation with Univ. Paris-Saclay):

M2 ICS Integration, Circuits & Systems

M2 MICAS Machine, Learning, Communications and Security

M2 MN Multimedia Networking

M2 ROSP Optic Networks & Photonic Systems

M2 SETI Embedded Systems & Information Processing

M2 Radio Systems

M2 TRIED Information Processing & Data Exploitation

PhD Track in Electrical Engineering for

Communications & Information Processing

Master's in Computer Science:

M1-M2 CPS Cyber Physical Systems

M2 CSN Computer Science for Networks

M1 & M2 Cyber Cybersecurity

M1-M2 Data AI Data & Artificial Intelligence

M1-M2 MPRI Foundations of Computer Science

M1-M2 HPDA High Performance Data Analytics

M1-M2 IGD Interaction, Graphics & Design

M1-M2 MPRO Operation Research

M1-M2 PDS Parallel & Distributed Systems

PhD Track in Computer Science

Masters en Innovation, Business & Society:

M2 IREN - Network industries and Digital Economy

M2 PIC - Design Innovation Project

M2 COSI - Organizational, Strategic and Information System Consulting

PhD Track in Innovation Industry & Society

Master's in Mathematics and Applications (co-accreditation with Univ. Paris-Saclay):

M2 MdA - Mathematics of Randomness

M2 MSV - Mathematics for the Life Sciences

M2 MVA - Mathematics, Vision, Learning

M2 Optimization

PhD Track in Mathematics Jacques Hadamard

Master's in applied mathematics, statistics:

M2 - Data Science

M2 - Mathematical Modeling

M2 - Statistics, Finance and Actuarial Science

M2 - Probability & Finance

PhD track in Data Science and Artificial Intelligence

MULTIDISCIPLINARY PARTNERSHIPS



Multidisciplinary partnerships are available regardless of the track completed during your 2nd year. There are specific prerequisites for each option.

A DUAL DEGREE FROM A FRENCH GRADUATE SCHOOL

> Télécom Paris may apply to **HEC Paris** to earn the Grande École degree from HEC Paris and the Engineering degree from Télécom Paris (in two years).

> The dual degree from **ENSAE Paris** provides a two-year program in actuarial science, data science, finance and risk management, markets and companies.

> **IFP School** offers a two-year program on energy to meet industry needs and societal expectations in terms of sustainable development and innovation in technical, industrial, economic and financial aspects.

> The dual degree from **ENS Lyon** offers a two-year research and teaching program.

After earning your degree, you may apply to **Corps des Mines** or the **Corps de l'Armement**.



AN OPTION FROM ONE OF OUR OUTSTANDING PARTNERS

> 3rd year at an **Institut Mines-Télécom** school.

> 3rd year at one of the schools in the **ParisTech** network (École des Ponts ParisTech, AgroParisTech...)

> **Management, Innovation, Digital** option in partnership with **Sciences Po**

This Master's degree aims to develop innovation in all corporate professions through cross-disciplinary and complementary functions developed at each of our schools.

> **"Digital for Health" program** with **Institut Mines-Télécom** and the **University of Montpellier 2**

This program trains research and development engineers who master new technologies used in aspects of health professions.

> **"Design-Innovation-Project" Master's program (PIC)** with **X, HEC Paris, Mines ParisTech** and **Université Paris-Dauphine**

A degree program focused on project management in the business world. This Master's program trains experts in the implementation and coordination of corporate innovation processes.

> **"Network Industries and Digital Economy" Master's program (IREN)** with **X, CentraleSupélec, Université Paris-Dauphine** and **Université Paris-Sud**

This Master's program allows students to master the operating principles of network industries and the digital economy and gain the analysis skills and methodology needed to monitor rapidly changing phenomena.

INTERNATIONAL OPTION

The Training Abroad program offers a unique opportunity to explore new horizons while receiving training of the highest standard. You can pursue this experience through Erasmus, at a partner university, or through an exchange program abroad (degree or non-degree options available).

International training is open to our students from French universities or who have been admitted to the first year through entrance exams.

The Training Abroad Program (FAE) can be either a degree program (Dual Degree, Master of Science) or a non-degree program (Erasmus program in particular).

A dual degree completed abroad can last 12, 18 or 24 months. The engineering internship may be completed during this dual degree program in the host country or upon returning to France at the end of the academic program.



INTERNATIONAL MOBILITY AT TÉLÉCOM PARIS

Télécom Paris students are required to complete a study period abroad during their studies. In order to fully take advantage of this rich experience, students generally leave for one semester.

This study abroad experience can take several forms: as a first-year internship, a one-year experience at a company (gap year) or during an academic stay.

MOBILITY: STUDY STAYS AND INTERNSHIPS

Non-degree study abroad programs

- One or two semesters during the 2nd or 3rd year.
- Short stays: ATHENS weeks, summer schools.

Degree study abroad programs

- 4 semesters studying at the School (including 1st and 2nd years).
- 1 engineering internship semester.
- 2 semesters studying abroad.

Engineering internship

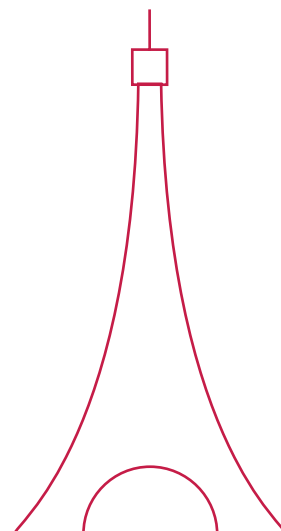
- Six months in 3rd year.

Intermediate internship

- July-September (between 2nd and 3rd year).

TÉLÉCOM PARIS,

LOCATED ON THE INSTITUT POLYTECHNIQUE DE PARIS CAMPUS



A DIGITAL
DOCUMENT
RESEARCH CENTER
OPEN 7 DAYS A
WEEK



ONE UNIVERSITY
RESTAURANT AND
TWO CAFETERIAS



STUDENT HOUSING
NEAR THE SCHOOL
AND AT THE CITÉ
UNIVERSITAIRE DE
PARIS



CONTACTS

admissions@telecom-paris.fr

19 place Marguerite Perey
F-91120 Palaiseau
www.telecom-paris.fr



IP PARIS