

**INSTITUT
POLYTECHNIQUE
DE PARIS**

Master of Science and Technology
Programs

(Please note this brochure is indicative of the structure/courses of all programs and may be subject to change!)



Visual and Creative Artificial Intelligence



Trustworthy and Responsible Artificial Intelligence





Internet of Things: Innovation and Management

YEAR 1	YEAR 2
PERIOD 1 Refreshers: - IoT Refresher - Company simulation Core Courses: - Practical C and Java Programming, Algorithms, and Data Structure - IoT Workshops - From the Internet to the IoT – The Fundamentals of Modern Computer - Business model for impact in the digital world - Digital and Analog Electronics	PERIOD 1 - Microfluidics and Biosystems - A Programmer’s Introduction to Computer Architectures and Operating - Safe Intelligent Systems - Foundation of Machine Learning - Database Management Systems - Fundamentals of Strategy and innovation PERIOD 2 - Digital Economics - Machine learning II - Technology-Based Entrepreneurship and New Business Creation - Practical cases & Research by sectorial immersions TRANSVERSE - IoT Project & Workshops - IoT Seminars PERIOD 3 16-20 week research or industrial internship

Cybersecurity

YEAR 1	YEAR 2
- Computer Networking Fundamentals - Network Security - Computer Architectures and Operating Systems - Cryptology - Formal Methods for Software Security - Scientific Writing & Analysis - Introduction to Cyber governance - Facing the Unknown - Select Topics in Cybersecurity 16-20 week internship complete immersion within a cyber-security research and development team — in a government organization, research laboratory, or company.	- Modern Software Architectures & Processes - MCO/MCS - Embedded Systems Security - Reverse engineering vs Obfuscation - Penetration Testing - Digital Forensics - AI for Cybersecurity and the Cyber-risks of AI - ISO 27k1 - Construction and Audit of information security management systems - ISO 27k5 - Management of Information-Systems Risks - Incident Response 20-24 week internship complete immersion within a cyber-security research and development team — in a government organization, research laboratory, or company.

(Please note this list is indicative of the structure of the degree and may be subject to change!)

Extended Cinematography



Energy Environment: Science, Technology, and Management

YEAR 1

YEAR 2

PERIOD 1 BEGINNER LEVEL SCIENCE AND TECHNOLOGY - o Bootcamp - Cinema Essentials - o Bootcamp - Computer Graphics and 3D Programming - o Modeling - o Animation - o Computer Vision CINEMA, AUDIOVISUAL AND VIRTUAL PRODUCTION - o Ecosystem and Management - o Historical Perspective - o Virtual Production - o Practical Projects in Virtual Production ART AND SCIENCE - o Creative Project - o Seminar and Workshops LANGUAGE AND PHYSICAL ACTIVITIES - o Foreign Languages - o Sport Activities PERIOD 2 - o Work in Partner Company	PERIOD 3 INTERMEDIATE LEVEL SCIENCE AND TECHNOLOGY - o Rendering - o Game Engine - o Technical Director - o AI CINEMA, AUDIOVISUAL AND VIRTUAL PRODUCTION - o Narratology and Script Analysis - o Aesthetic and Technical Analysis - o Virtual Production - o Practical Projects in Virtual Production - o Capstone Film Project in Virtual Production ART AND SCIENCE - o Creative Project - o Seminar and Workshops LANGUAGE AND PHYSICAL ACTIVITIES - o Foreign Languages - o Sport Activities PERIOD 4 - o Work in Partner Company	PERIOD 5 ADVANCED LEVEL SCIENCE AND TECHNOLOGY - o Bootcamp - Unity Essentials - o Smart Models - o 3D Scenes Capture & Reconstructions - o Augmented Reality - o Sound CINEMA, AUDIOVISUAL AND VIRTUAL PRODUCTION - o Innovation and Responsibility - o Harassment and Gender-Based Violence - o Virtual Production - o Practical Projects in Virtual Production - o Capstone Film Project in Virtual Production ART AND SCIENCE - o Creative Project - o Seminar and Workshops LANGUAGE AND PHYSICAL ACTIVITIES - o Foreign Languages - o Sport Activities PERIOD 6 - o Work in Partner Company	PERIOD 7 SPECIALIZED LEVEL SCIENCE AND TECHNOLOGY - o Motion Capture - o Natural Phenomena and VFX - o Technical Director - o Film Analysis & Generative AI CINEMA, AUDIOVISUAL AND VIRTUAL PRODUCTION - o Ethics, Rights, and Entrepreneurship - o Next Generation Storytelling - o Virtual Production - o Practical Projects in Virtual Production - o Capstone Film Project in Virtual Production ART AND SCIENCE - o Creative Project - o Seminar and Workshops LANGUAGE AND PHYSICAL ACTIVITIES - o Foreign Languages - o Sport Activities PERIOD 8 - o Work in Partner Company
--	---	--	---

YEAR 1

YEAR 2

Refresher course in Physics during the welcome weeks PERIOD 1 SELECT 3 COURSES - o Hydrology: Global changes and their impact on Water resources - o Mechanics for Wind energy, an Introduction - o Greenhouse Gases (GHG) Challenges and Observations - o Energy and Environment - o Photovoltaics & Solar Energy - o Power Electrical Engineering for renewable energy MATHEMATICAL AND NUMERICAL TRAINING - o Refresher Course in Maths and a Project on Numerical Modeling Done in Twos MANAGEMENT COURSE - o Energy Industry Value Chain	PERIOD 2 SELECT 2 COURSES - o Decision Theory, with Applications to Energy Systems - o Meteorology and Environment - o Hydro, Wind and Marine resources - o Geological Storage of Energy and Wastes - o Material Science for Energy Conversion and Storage SELECT 1 COURSE - o Projects in Solar and Wind Energy: Resource and Performance Analysis - o Laboratory course in Photovoltaics - o Experimental work in environmental Physics MANAGEMENT COURSE - o Sustainable Strategy and Business Models TRANSVERSE COURSE - o Coriolis Conferences and Industry visits OPTIONAL COURSE - o Python for beginners INTERNSHIP - o 16-20 week research or industrial internship.	PERIOD 1 SELECT 3 COURSES - o Nature-based solutions to substitute fossil Resources and address Global change - o Chemical storage of Energy - o Machine learning for Climate and Energy - o Introduction to Atmospheric Composition: from Processes to Modeling and Air Quality Regulations - o Sea States, Wave Propagation, and Ocean Wave Energy - o Organic-Based Materials for the 3rd Generation of Solar Cells - o Building and Using Models for the Energy Transition MANAGEMENT COURSE - o Designing Projects and Managing Operations in the Energy Industry PERIOD 2 SELECT 3 COURSES - o Renewable Thermal energy - o Climate Change and Energy Transition	- o CO₂ Emission Reduction: Substitution, Paths, Negative CO₂ Emissions and CCUS - o Thin Film Photovoltaics - o Smart Grid for Renewable Energy - o Energy Economics with a Geography Focus SELECT 1 COURSE - o Managing Sustainable innovation - o Technology Development for a Sustainable future for all SELECT 1 COURSE - o Photovoltaic Technology in Industry - o Advanced Experimental smart grid - o Wind Power TRANSVERSE - o Coriolis conferences and Industry visits INTERNSHIP - o 20-24 week research or industrial internship.
---	--	--	---



More detailed
course descriptions

Environmental Engineering and Sustainability Management



Refreshers in Chemistry and Biology during the welcome weeks

PERIOD 1

- o Environmental Chemistry
- o Microbial Ecology for Environmental Sciences
- o Analytical Chemistry

MANAGEMENT COURSE

- o Energy Industry Value Chain

PERIOD 2

- o Environmental Ecotoxicology
- o Life Cycle Assessment and other tools to Design Ecotechnologies I
- o Waste water treatment

MANAGEMENT COURSE

- o Sustainability, Business Models and Entrepreneurship

TRANSVERSE

- o Collective scientific project
- o Coriolis conferences
- o Field Trip and Company visits

INTERNSHIP

- o 16-20 week research or industrial internship

PERIOD 1

- o Hydrology
- o Solid Waste Valorization
- o Soil Pollution and Remediation

MANAGEMENT COURSE

- o Corporate Finance for the Entrepreneur

PERIOD 2

- o Drinking Water
- o Exploration and Statistical Analysis of Complex Datasets

SELECT 1 COURSE

- o Life Cycle Assessment (LCA) and other tools to Design Ecotechnologies II
- o Method Validation

SELECT 1 COURSE

- o Environmental Humanities
- o Molecular Biogeochemistry

MANAGEMENT COURSE

- o Case Studies on Innovation

TRANSVERSE

- o Collective scientific project
- o Coriolis Conferences
- o Field trip and companies visits

OPTIONAL COURSE

- o Python for beginners

INTERNSHIP

- o 20-24 week research or industrial internship

Economics, Data Analytics and Corporate Finance



PERIOD 1

- Integration Week (Mid-September)
- Refresher in Econometrics
- Refresher in Microeconomics

- o Industrial Organization
- o Applied Econometrics 1
- o Corporate Finance
- o Python

SELECT 1 COURSE

- o Financial Decisions under Risk 1
- o Market Design
- o Urban Eco. & Real Estate
- o Environmental economics
- o Case Studies in Corporate Finance
- o Private Equity
- o Blockchain I Bitcoin and Smart-Contracts (ENSAE)

PERIOD 2

- o Applied Econometrics II
- o Advanced Corporate Finance
- o Business Economics

SELECT 1 COURSE

- o Competition Policy
- o Financial Decisions under Risk 2
- o Merger & Acquisition (ENSAE)
- o Behavioral Finance
- o Digital Economics
- o Seminar in Quantitative Marketing (ENSAE)
- o Economics of biodiversity
- o Environmental Economics II
- o Energy economics with geography focus
- o Law and Finance

2 BUSINESS GAMES

- o Sectorial strategic simulation
- o Business Game II

TRANSVERSE

- o Lecture series in public policy

PERIOD 3

- o 16 to 20 week research or industrial internship



FINANCE TRACK PERIOD 1

- o Econometrics of Competition
- o Valuation of Start ups
- o Business Models in a digital era

SELECT 2 COURSES

- o Financial Decisions under Risk 1
- o Blockchain 1 : Bitcoin and Smart-Contracts
- o Case Studies in Corporate Finance
- o Private Equity

PERIOD 2

- o Financial Markets
- o Big Data
- o Lecture series in finance and economics

SELECT 2 COURSES

- o Financial Decisions under Risk 2
- o Merger & Acquisition (ENSAE)
- o Behavioral Finance
- o Law and Finance

PERIOD 3

- o 20 to 24 week Research or industrial internship

ECONOMICS TRACK PERIOD 1

- o Firms & Markets
- o Econometrics of Competition
- o Business Models in a digital era

SELECT 2 COURSES

- o Urban Eco. & Real Estate
- o Environmental Economics
- o Dynamic pricing and revenue management (ENSAE)

PERIOD 2

- o New Technologies and the sharing Economy
- o Big Data
- o Lecture series in finance and economics

SELECT 2 COURSES

- o Energy economics with geography focus
- o Competition Policy
- o Digital Economics
- o Seminar in Quantitative Marketing (ENSAE)
- o Economics of biodiversity
- o Environmental Economics II

PERIOD 3

- o 20 to 24 week Research or industrial internship

Data and Economics for Public Policy



YEAR 1

- PERIOD 1**
- o Applied Econometrics I
 - o Microeconomics and Statistics for Public Policy
 - o Python and Stata for Data Science

- SELECT 1 COURSE**
- o Industrial Organization
 - o Urban Eco. & Real Estate
 - o Environmental Economics
 - o Methods in Quantitative Sociology

- SELECT 1 COURSE**
- o Ethics and Responsibility in Data Science
 - o *Droit Administratif* (in French)

- PERIOD 2**
- o Applied Econometrics II
 - o Data Analysis in Economics: Collection and Visualization
 - o Introduction to statistical learning

- SELECT 1 COURSE**
- o Economics of Biodiversity
 - o Economics of Energy Sectors

- SELECT 1 COURSE**
- o Ethical Challenges and AI
 - o Internet and Society
 - o *Finances Publiques* (in French)

- TRANSVERSE**
- o Lecture Series in Public Policy
 - o Applied project: Policy-In-Action Consultancy

- PERIOD 3**
- o 16-20 week research or industrial internship

YEAR 2

STUDENTS WILL CHOOSE ONE OF THE 2 SPECIALIZATIONS

SOCIAL POLICIES

- PERIOD 1**
- o Applied statistical learning
 - o Microeconomic Evaluation for Public Policies

- SELECT 2 COURSES**
- o Labor Economics
 - o Health Economics
 - o Public Economics and Public Finance
 - o Randomized Methods and Policy Evaluation

- SELECT 1 COURSE**
- o Experiments in Economics and Social Sciences
 - o Ethics and Responsibility in Data Science
 - o *Droit Administratif* (in French)

- PERIOD 2**
- o Machine Learning for Econometrics
 - o Machine Learning for NLP
 - o Economics of Redistribution and Social Insurance.

- SELECT 2 COURSES**
- o Development Economics
 - o Economics of Inequality: Measure and Findings
 - o Sociological Perspectives on Social Inequality
 - o Applied Labor Economics
 - o Empirical Environment Economics

- SELECT 1 COURSE**
- o Topics in the History of Applied Economics
 - o Internet and Society
 - o Data Storytelling
 - o *Finances Publiques* (in French)

- TRANSVERSE**
- o Lecture Series in Public Policy
 - o Applied Project

- PERIOD 3**
- o 20-24 week reasearch or industrial internship

SECTORAL POLICIES REGULATION AND COMPETITION

- PERIOD 1**
- o Econometrics of Competition
 - o Industrial Organization or Theory of Industrial Organization

- SELECT 2 COURSES**
- o Market Design
 - o Applied Statistical/ Machine Learning
 - o Theory of Industrial Organization
 - o Randomized Methods and Policy Evaluation

- SELECT 1 COURSE**
- o Experiments in Economics and Social Sciences
 - o Ethics and responsibility in Data Science
 - o *Droit Administratif* (in French)
 - o *Droit des TIC* (in French)

- PERIOD 2**
- o Sectorial Regulations
 - o Competition Policy

- SELECT 2 COURSES**
- o New Technologies and the Sharing Economy
 - o Competition and Regulation of the Digital Economy
 - o Microsimulation methods and Public Policy
 - o Digital Economics
 - o Economics of the Energy Markets

- SELECT 1 COURSE**
- o Internet and Society
 - o Data Storytelling
 - o Topics in the History of Applied Economics
 - o *Finances Publiques* (in French)

- TRANSVERSE**
- o Lecture Series in Public Policy
 - o Applied Project

- PERIOD 3**
- o 20-24 week reasearch or industrial internship

Economics for Smart Cities and Climate Policy

YEAR 1

PERIOD 1 MANDATORY COURSES

- o Urban Economics and Real Estate
- o Environmental Economics and Policies in Cities
- o Applied Econometrics
- o Python 1

- PERIOD 2 MANDATORY COURSES**
- o Cities and transportation
 - o Applied Econometrics 2

- SELECT 1 COURSE**
- o Energy economics with a geography focus
 - o Digital Economics
 - o Economics of Biodiversity
 - o Economists facing nature
 - o Environmental economics 2

- 1 MANDATORY WORKSHOP**
- o Geographical information systems 1

- TRANSVERSE**
- o Capstone project
 - o Lecture series in Public Policy

- PERIOD 3**
- o 16-20 week research or industrial internship

YEAR 2

PERIOD 1 MANDATORY COURSES

- o Traffic and transportation systems in urban context
- o Urban services and utilities
- o Python 2

- MANDATORY MIE COURSE**
- o Fundamentals of Strategy and Innovation

- PERIOD 2 2 MANDATORY COURSES**
- o GIS and public policies
 - o Economics of energy sectors

- SELECT 2 COURSES**
- o Digital Economics
 - o Economics of Biodiversity
 - o Economists facing nature
 - o Environmental economics 2
 - o COP Climate (Period 1)
 - o Introduction to statistical learning
 - o Energy economics with a geography focus

- TRANSVERSE**
- o Capstone project : Paris Climate Action plan Evaluation II
 - o Lecture Series ESCLIP

- PERIOD 3**
- o 20 to 24 -week research or industrial internship



Data Science and AI for Business X - HEC

IN PARTNERSHIP WITH
HEC
PARIS



PERIOD 1

DATA SCIENCE BOOTCAMP

- o Hands-on Introduction to Data Science

MANDATORY COURSES

- o Statistics
- o Linear Algebra and Regression
- o Machine Learning 1
- o Python / R
- o Machine Learning 2
- o Database Management
- o Datacamp

PERIOD 2

MANDATORY COURSE

- o Optimization/ Deep Learning

SELECT 1 COURSE

- o Capgemini Data Camp Projects
- o Data Challenge

PERIOD 3

INTERNSHIP

- o 16-20 week Internship in a company

CORE COURSES

- o Data for business challenges
- o Data engineering courses: using the latest tools (Spark, Github, Daitaku, Tableau...) to build and deploy models
- o Advanced coding in Python for Machine Learning
- o Reinforcement learning and advanced Deep Learning
- o Data & Strategy, Data & Finance, Data & Sustainability, Data & Regulation, Data for Ethics
- o Algorithmic Fairness & Interpretability

BUSINESS CHALLENGES

- o Data challenge Natixis
- o Data Business challenge Sustainability

TRACKS

- o Data Manager & Consultant: Joining a data science department of a company or a consulting firm to help clients develop business by leveraging data
- o Data Entrepreneur: Joining the HEC Startup Launchpad and creating a startup

Learning expedition:
Paris, London to discover the companies using Data to develop their business

Double Degree Data and Finance X - HEC

IN PARTNERSHIP WITH
HEC
PARIS



PERIOD 1

DATA SCIENCE BOOTCAMP

- o Hands-on Introduction to Data Science

MANDATORY COURSES

- o Statistics
- o Linear Algebra and Regression
- o Machine Learning 1
- o Python / R
- o Financial Markets
- o Machine Learning 2
- o Numerical processing of Financial Data

PERIOD 2

MANDATORY COURSES

- o Deep Learning in Finance
- o Optimization/ Deep Learning

PERIOD 3

INTERNSHIP

- o 16-20 week compulsory internship within a company in a data-related sector, including investment banks (BNP-Paribas, BPCE), hedge funds and firms such as Microsoft, Facebook, Orange, Capgemini.

CORE COURSES

- o Soft skills seminar
- o Ethics seminar
- o Probability and statistics refresher
- o Behavioral and Sustainable Finance
- o Introduction to finance
- o Corporate finance
- o Financial accounting and reporting
- o International macroeconomics
- o Economics of Financial Regulation
- o Empirical Methods in Finance

ADVANCED CORE COURSES

- o Fixed income and MM
- o Securities markets
- o Capital markets
- specialization courses:
 - Financing Engineering
 - Quantitative asset management
- o Corporate finance
- specialization courses:
 - Corporate restructuring
 - Derivatives

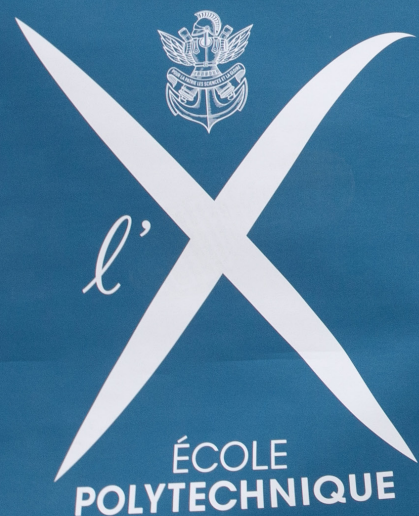
DATA & FINANCE CORE COURSES

- o Introduction to Data Science and AI for managers

- o Data Analysis in Finance
- o Technology Regulation in the Financial Sector
- o Algorithms, Data & Trading
- o Blockchain & cryptocurrencies

FREE ELECTIVES

- o Credit Risk & Turnaround of distressed Companies
- o Energy and Finance
- o Infrastructure and Real Assets
- o Real Estate Foundations
- o Numerical Analysis
- o Financing Decisions of the Firms
- o Post-Merger Integration
- o Micro-economics of Crisis Economies
- o Energy Markets
- o Bond Portfolio management
- o Sustainable & Responsible investment
- o Alternative Investments
- o Financial Modelling
- o Corporate Finance Live
- o Quantitative Asset Management
- o Financial Dimension of Strategic Decisions
- o Start-up Valuation and Financing



IP PARIS

Master of Science and Technology

Welcome
to our new students!

Connect with us



Master of Science and
Technology - École
Polytechnique



master_polytechnique



Master of Science and
Technology - École
Polytechnique



Chat with us at
+33 764 86 55 20



polytechnique_
students_x



Chat with us in Unibuddy
- programmes.
polytechnique/chat-with-
our-students

Contact us



Rte de Saclay, 91120 Palaiseau



+33 6 04 93 98 66



<https://www.polytechnique.edu>

Issue - March 2025
Photo Credits - Jeremy Barande



INSTITUT
POLYTECHNIQUE
DE PARIS