Projects for Industrial Innovation (Pi²)

These Projects concerns students from the 9 majors of ESILV:

- Financial engineering & Quantitative finance
- Actuarial science
- Fintech
- IoT & Security
- Data & Artificial Intelligence
- Modeling & computational mechanics
- Industry 4.0
- Energy and sustainable cities
- Health Engineering & Biotechnology

Rules of operation:

- *An Esilv project team consists of four students.*
  The team can bring together students from different Esilv majors according to the scope of the project.
- *The amount of work required in the project is 10 hours per week per student, or 40 hours per week per team.*
- *Teams are followed internally by ESILV, in relation with the partner who proposed the topic.*
- *A partner may have several teams cooperating on a single project, if there is enough work for each team (internally denominated "Huge Task Ahead" project and internally coordinated in Esilv).*
- *A partner may have several teams in fair competition on a single project.*
- *Each project ends with a restitution meeting (closing of the project).*
- *The students choose their project (they are advised - even oriented - by the teaching team) during a dedicated day.*

Projects start mid-September and end at the end of January for A5, end of March for A4.

The call for projects will take place in June.

Project launch days will be held in September (for years 5 and then for years 4) during which the partners will be able to present their projects, then the students will form their teams and choose their subject.

The A4 go on an internship from April to September at the end of the project, which gives ***the opportunity to propose in the subject of the project an extension in internship****. Same in A5, but their internship is often a pre-employment internship (departure early February, for 6 months).*

The goal of the Pi² is to push the students to appropriate a new subject in a very professional context through the relationship with the industrial partner. They must acquire new skills, both in Hard Skills and Soft Skills.

The Pi² remains a pedagogical project whose partner must be able to obtain a real benefit. The internship then makes it possible to push the work further (ex: putting into production).

Main tasks that can be requested in Pi²:

1. Realization of a state of the art.
2. Comparative study of technical solutions to a given problem (feasibility, cost, etc ...).
3. Study of a given problem and proposition of an argumentative solution.
4. Realization of a Proof Of Concept.
5. Realization of technical tasks in a major project of the Partner.

The students of each major develop in A4, A5 specific technical skills. A project may be transverse to several majors, i.e. the team may consist of different major students.

The purpose of the projects is to enable students to use these skills as well as to encourage them to acquire new ones. The discovery and the autonomous implementation of new technical fields is an integral part of the skills they must acquire.

Depending on the majors, here are some technical areas to focus on:

- Financial engineering & Quantitative finance
  - Pricing of financial instruments : technical design and / or implementation
  - Quantitative or statistical analysis of data
  - Time series analysis
  - Asset management, analysis and portfolio management
  - Development of innovative financial products
  - Big data, ML and IA for finance
  - Robotrading, roboadvisory, design / trading platform development

- Actuarial science
  - Cyber Insurance
  - Insurance fraud
  - Insurtech

- Fintech
  - Blockchain
  - Cryptocurrencies (Bitcoin, Ethereum, …)
  - DLT and applications

- IoT & Security
  - IoT-IIoT (networks, WSN, M2M, etc…)
  - Edge computing
  - Machine Learning/Deep Learning/Intelligence of things
  - DevSecOps
  - Mobile applications
  - Web development (node/angular)
  - Blockchain/IOTA
  - Cybersecurity & Cyber resiliency
  - Security by design

- Data & Artificial Intelligence
  - Cloud Computing
  - Machine Learning/Deep Learning
  - Data Mining
  - Devops
  - AR/VR
  - Data visualisation
  - Web development (node/angular)
  - Big Data

- Modeling & computational mechanics
  - Numerical modeling of structures
  - Modeling complex systems
  - Fluid mechanics and simulations
  - Multidisciplinary optimization and reliability

- Industry 4.0
  - Mechatronics, robotics, cobotics
  - Sensors & metrology
  - Real time embedded software and systems
  - Avionics and control systems
  - Industrial Systems Engineering
  - Multidisciplinary optimization and reliability

- Energy and sustainable cities
  - Study, sizing of renewable installations
  - Energy efficiency study
  - Sensors / IoT
  - Embedded systems
  - Sustainable development
  - Machine Learning
  - Systems modeling
  - Smart buildings
  - Smart cities

- Health Engineering & Biotechnology
  - Physiological sensors, instrumentation and metrology
  - Modeling of physiological phenomena
  - Modeling of complex systems
  - Machine Learning
  - E-health
  - Biomaterials
  - Bionics

- Neurological interfaces
- Signal processing and image processing
- Wearable connected objects

Majors more in detail :

Financial engineering & Quantitative finance

The Financial engineering & Quantitative finance Major teaches all the skills necessary to understand and master the complexity of modern financial markets. It takes into account the reality and trends of the modern banking industry and financial markets. In addition to core investment management techniques and the mathematical methods of derivatives pricing, the major teaches high frequency trading, and the new risk management methodologies required by new financial directives. An important part of the major is the teaching of the methods and techniques of modern Fintec, including the use of AI, machine learning, cryptocurrencies and new blockchain distributed ledger technologies .

#QuantitativeFinance
#Mathematics
#ComputerScience
#RiskManagement
#FinancialMarket
#Regulation

Actuarial science

The Major actuarial science is at the heart of the future challenges of the financial engineer of tomorrow. The role of insurance is to protect individuals and businesses from hazards, sustain growth with long-term investments and prepare the world of tomorrow by pushing the boundaries of insurability further. Our students have innovative approach to making business successful is matched by a responsibility to the public interest. Actuaries identify solutions to financial problems. They manage assets and liabilities by analyzing past events, assessing the present risk involved and modeling what could happen in the future. The goal of the Major is to train actuarial engineers in risk management methods, data analysis and actuarial techniques that can easily fit into the professional world.

#Insurance
#Statistics
#DataAnalysis
#Regulation
#Finance
#RiskManagement

Fintech

Both technological and legal revolutions have radically changed the world of finance. Fintechs are creating a new financial industry, deploying technology to improve financial activities. This Major aims to train future engineers in all the innovative technologies (Machine Learning, Web services, Blockchain, etc) , which are essential to evolve and reinvent the finance profession in these companies.

#Blockchain
#Finance
#Bitcoin
#ComputerScience
#Cryptography

IoT & Security

Computer engineers from this major are taught to understand and design systems of connected objects or services. It also aims at securing systems and integrating them into business ecosystems. In the near future, in a hyper connected world, this major positions the students as professionals capable of facing all future challenges brought about by connected services.

#CyberSecurity
#RiskManagement
#IoT
#AI
#Networks
#ComputerScience

Data & Artificial Intelligence

The aim of this major is to teach engineers to become data specialists for either standard and massive collections of data by modeling and storing it for analytics.
They will be involved in AI (Artificial Intelligence) and valorization projects which target innovation in all economic and industrial sectors.

#AI
#BigData
#MachineLearning
#DataScience
#Cloud
#ComputerScience

Modeling & computational mechanics

The Modeling and Computational Mechanics major trains engineers to be able to design and develop new products and complex systems, especially in the aeronautic and automobile industries. It is based on modelling and numerical simulation allowing the understanding of the complete chain of digital design: interaction with the environment, modelling and numerical tools, dynamic optimization, multi-physical and multi-scale approaches.

#Aeronautic
#Automobile
#Mathematics
#Simulation
#DesignOffice

Industry 4.0

This Major trains future engineers to implement modern industrial systems that fully integrate the tools and technologies of the digital revolution. Students will be able to work on production or service sites of industrial companies in all sectors in France and abroad.

#3DPrinting
#Agility
#DigitalTransformation
#AI
#ConnectedIndustry

Energy and sustainable cities

The main goal of this Major is to train students capable of designing, developing and governing Smart Buildings and Sustainable Cities. The curriculum will share advanced knowledge of the energy issues, sustainable development and and is based on three scientific pillars: (i) physics and energy management, (ii) digital technologies and (iii) modeling of cities and buildings.

#EnergeticTransition
#Innovation
#IoT
#BIM
#SmartCity
#Mobility
#SustainableDevelopment

Health Engineering & Biotechnology

This major trains engineers able to evolve in the multidisciplinary ecosystem of technology for health. It is based on courses combining the life sciences, technologies, IT and Big Data & Artificial Intelligence. The engineers in this Major are in the interconnection between the human, the technology and the health professionals.

#Data
#ConnectedHealth
#Mechatronics
#AI
#Human