CentraleSupélec | université PARIS-SACLAY

Engineering Curriculum
KEY ELEMENTS

Academic year 2023-2024

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Dear student engineers, welcome to CentraleSupélec!

We are pleased to welcome you to a school that offers you many opportunities to build a professional project that suits you.

Thanks to increasingly professional educational activities, thematic courses, a wide range of mobility opportunities and meetings with companies, engineers and experts who are partners of the School, you will have all the cards in hand to personalize your curriculum.

Our program will enable you to progressively develop your skills in the key qualities of an engineer. You will discover scientific fields, professions and sectors of activity in which you can engage to meet the major challenges that our society must face in the 21st century.

Our mission is to support you in finding your path and providing you with the tools to succeed. The success of your time at the School will depend on your commitment to building your talents.

Romain Soubeyran
CentraleSupélec Director General

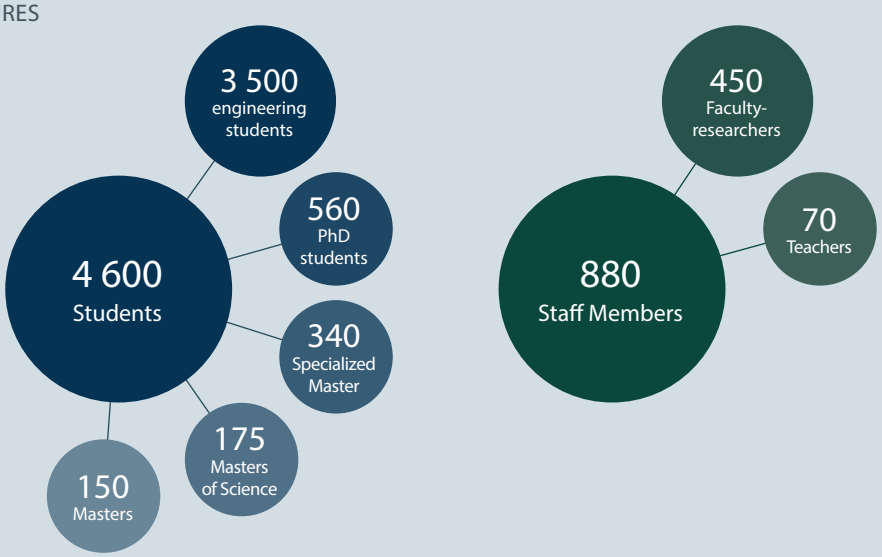
#1

GET TO KNOW CENTRALESUPÉLEC BETTER

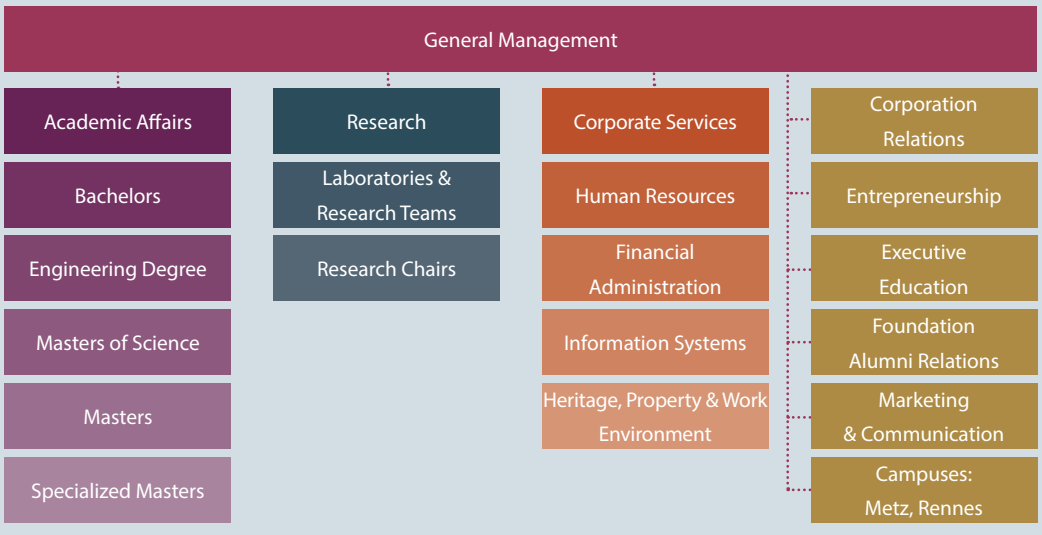
Numerous teams and departments contribute to the functioning of CentraleSupélec and to the smooth running of the engineering curriculum.

A complete digital environment contributes to the monitoring of courses and students' course preferences.

KEY FIGURES



SIMPLIFIED ORGANIZATION CHART



THE PARIS-SACLAY CAMPUS

THE CAMPUS

The Paris-Saclay campus, with a surface area of 105,000 m², is at the heart of the Paris-Saclay cluster. It is composed of 3 buildings – the Eiffel Building, the Bouygues Building, and the Bréguet Building – housing teaching facilities (auditoriums, classrooms), research laboratories, collaborative workspaces, premises dedicated to student community life, sports facilities, university restaurant and cafeterias, as well as a FabLab and an incubator.

In the near surroundings of the campus, Césal provides more than 2,500 rooms spread over several types of accommodation for CentraleSupélec students.

THE PARIS-SACLAY ECOSYSTEM

CentraleSupélec is a founding member of the University of Paris-Saclay, which brings together Grandes Écoles (CentraleSupélec, AgroParisTech, ENSAE, ENS Paris-Saclay, IOGS), universities and research organizations.

It brings together 15% of French research, 48,000 students, and 4,600 doctoral students. This research-intensive University of international standing is ranked 16th in the Shanghai 2022 ranking (first University in continental Europe) and, for the third year in a row, first in mathematics and 9th in physics.

At the start of the 2023 academic year, the Lumen Learning Center was officially opened to the public offering spaces, services, and content for studying, innovating, and sharing knowledge. The cluster is also home to private research centers: EDF, Danone, Servier, Thales, etc. trialists and the general public around collections, exhibitions, conferences, debates and experiments to discuss the challenges facing the University.

THE METZ CAMPUS

Ideally located on the outskirts of the city center, access to all main points of interest in the city is just a few minutes away by public transportation from the Metz campus which embodies CentraleSupélec's commitment to responsible development, both in terms of training and research, which are essential for all socio-economic players and public decision-makers.

In terms of research, the activities of teacher-researchers are carried out in internationally renowned laboratories and a research chair:

- LMOPS EA 4423
- LORIA UMR 7503
- GEORGIA TECH - UMI 2958
- The Chair in Photonics

Experimentation platforms are available to students, teacher-researchers and corporate partners:

- Mobile Robotics
- Connected apartment
- Holophony

EDUCATION

From the 1st year, Physics and Data Analysis problems are proposed to students, such as semi-autonomous navigation of drones, signal analysis and representation for source separation and data compression, etc.

Elective courses are also offered in the 2nd year on topics such as mobile applications, web services, C++ programming, Big Data, modern coding theory, audio data analysis, image processing, complex electronic embedded systems, light-matter interactions, intelligent photonic systems, chaos, fractals, and complexity. .

TWO 3RD-YEAR CONCENTRATIONS:

Data and Information Science

This concentration, at the intersection of mathematics and computer science, trains data scientists who are both precise in the mathematical foundations of the most recent machine learning methods (statistical machine learning models, neural models, deep learning, etc.) and capable of efficiently implementing large-scale computer solutions involving these methods (optimized algorithms in C++, GPUs for deep learning, large-scale Big Data architecture, etc.).

Physics and Photonics applied to Information Processing

This concentration trains engineers in the paradigm shift that accompanies information processing and, more specifically, the problems associated with computing, storage and communication of information. The limitations of physics related to the miniaturization of electronic components and the limits of energy sources are leading society and engineers to design and develop innovative solutions for information processing.

THE RENNES CAMPUS

The Rennes campus offers a multidisciplinary training program, centered on the theme of Smart and Secure Life, starting in the second year of the CentraleSupélec curriculum, to understand digital sciences and techniques better. The courses and electives offered are based on the latest work of the four research teams on campus:

- Automation,
- Cybersecurity
- Electronics, Signal Processing and Telecommunications
- Emotional Analysis

THREE 3RD-YEAR CONCENTRATIONS:

Numérique et Vivant

This concentration aims to train eco-responsible, digitally-skilled engineers to meet today's and tomorrow's environmental and health challenges through prevention, patient or ecosystem monitoring and performance improvement.

Sustainable Energy Systems

This concentration provides mastery of concepts related to dynamic systems and the associated tools to prepare engineers for the energy transition (decarbonization of production, massive integration of renewable energies, sobriety of consumption, etc.).

Cybersecurity

This concentration brings the necessary keys to the success of the security of the information system, via training covering cryptology, prevention and detection of intrusions and malicious software, as well as various aspects of security engineering.

ENTREPRENEURSHIP

The Rennes campus has a dedicated space, "The Cave", devoted to developing start-up projects by students, doctoral students and staff members. It is also a place for exchanges with our teacher-researchers, themselves start-up creators. Co-working space is available and will be progressively extended and completed by a virtual reality/augmented reality laboratory and a FabLab.

RESEARCH

The Research Center welcomes engineering students who are particularly passionate about science through the "research track," that allows them to conduct research activities in one of the Center's laboratories throughout their studies. The 18 laboratories on our campuses are structured around the following disciplines:

- Applied Mathematics
- Applied Physics
- Electrical Engineering, Electronics
- IT and Information Systems
- Industrial Engineering, Economics and Management
- Materials and Processes
- Mechanics, Energy and Combustion
- Signal processing, Control

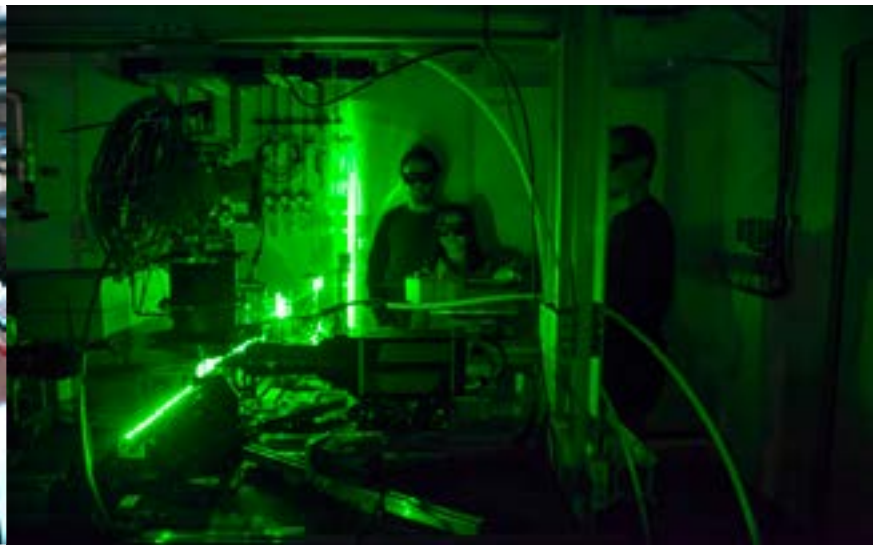
One of the strengths of the CentraleSupélec Research Center is its teams complementary skills, which makes it possible to address the complexity of systems to meet major societal challenges, in line with the objectives of the School's educational project. To meet these challenges, the Research Department has chosen to engage in coordinated actions between the various laboratories on the following unifying themes:

- Aeronautics and Space
- Biotechnology
- Cybersecurity
- Data Science & Artificial Intelligence
- Energy, Transport & New Mobility
- Health & Life Science
- Industry of the Future
- Networks and Telecommunications
- Environment & sustainability

CentraleSupélec is involved in 5 of the ten research departments of the Université Paris-Saclay:

- Mechanics, Energetics and Processes (MEP);
- Physics of Waves and Matter (PHOM);
- Information and Communication Sciences and Technologies;
- Mathematics;
- Electrical, Optical and Electronic Engineering (EOE).

It also participates in several cross-disciplinary groups: energy, materials, HPC, etc., and is the leader of the Graduate School of Engineering and Systems Sciences.



INTERNATIONAL INCOMING MOBILITY

A TEAM DEDICATED TO INTERNATIONAL STUDENT MOBILITY

International Incoming Mobility

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TOP 5 MOST REPRESENTED COUNTRIES:

- Morocco
- Tunisia
- Brazil
- Spain
- Lebanon

INTERNATIONAL KEY FIGURES:

- 200 academic partners
- 80 double degree agreements
- 26% of international students
- 2 key networks: T.I.M.E. & CESAER
- 3 international campuses, China, India, Morocco
- 1 European university dedicated to health

CORPORATE RELATIONSHIPS

The school has long developed very close relations with the business world by establishing partnerships allowing the companies to meet and contact students in the framework of different events and activities with the objective of discovering the different sectors and companies and engaging and discussing with alumni about in order to start thinking about their career path in term of internships and first job opportunities later on.

Many engineers are also involved in the curriculum, particularly in the context of the engineering challenge terms (the challenge weeks).

CentraleSupélec has nearly 150 partner companies in various sectors such as:

- Aeronautics
- Aerospace
- Insurance
- Automotive
- Audit
- Banking
- Construction
- Consulting
- Chemistry
- Communication
- Distribution
- Energy
- Industry
- Computer science

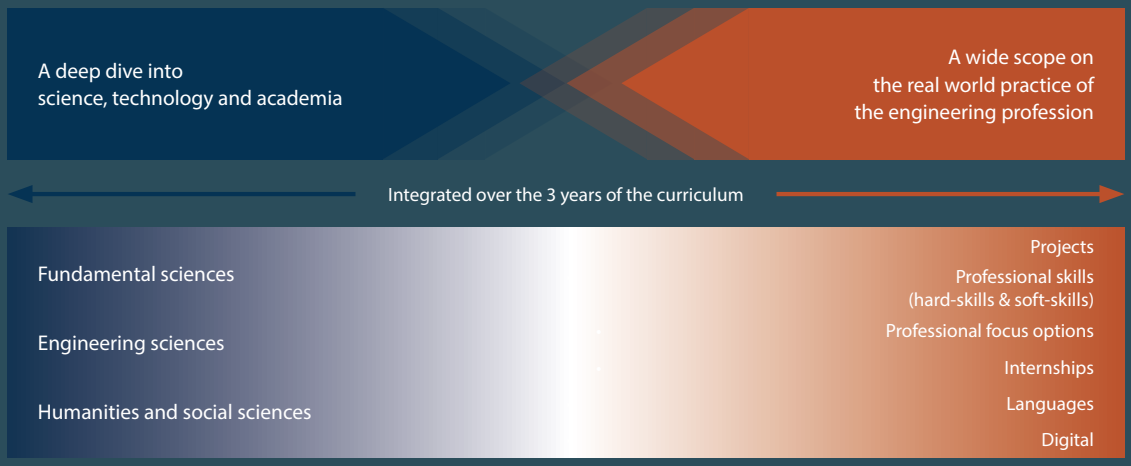
FRENCH ENGINEERING SYSTEM & EUROPEAN SYSTEM

European Higher Education		CentraleSupélec Engineering Curriculum	
1st Year	BSc.	Preparatory classes	1st Year
2nd Year		Preparatory classes	2nd Year
3rd Year		CentraleSupélec	1st Year
4th Year	MSc.	CentraleSupélec	2nd Year
5th Year		CentraleSupélec	3rd Year

#2

CENTRALESUPÉLEC CURRICULUM

BRINGING TOGETHER 2 MAJOR OBJECTIVES:



CentraleSupélec's engineering program is designed to last three years.

It's a generalist program, meaning that all CentraleSupélec students must acquire the skills and knowledge offered in the curriculum.

The curriculum, in its organization and progression, contributes to the definition of the student's professional project, and therefore includes a significant number of thematic courses intended in particular to prepare students for their career choices in the third year: concentrations and professional focus options.

A CURRICULUM WHERE STUDENTS PLAY AN ACTIVE ROLE IN CHOOSING THEIR PATH

Common educational activities (40%)	Elective educational activities * (60%)
• Core curriculum courses • Workshops (practices and professional projects) • Coding Weeks • Start-Up Week • Business Game	• Engineering Science courses • Engineering Challenge Term • Projects • Concentrations of 3rd year in the perimeter of the majors • Professional focus options (3A) • Internships

AN ENGINEERING CURRICULUM IN TRANSITION

In 2023, CentraleSupélec was awarded the DD&RS label for four years to recognize the relevance and impact of the actions deployed in its strategic approach to ecological and social transition. This reward is reflected in new courses in the curriculum

CORE CURRICULUM COURSES - 50 hours dedicated for all students to the ecological and social transition within the following courses:

- Workshops on decarbonation & energy transition
- IPBES Biodiversity course
- Systems engineering course
- Business management course
- Corporate Finance course
- IPCC Climate Science course
- Economics course

7 ELECTIVE COURSES, 6 ENGINEERING CHALLENGE TERMS & 8 PROJECT POLES

+ SPECIFIC ACTIONS IN 3RD YEAR

+ DOUBLE DEGREE COURSES :

THE SPECIFICITIES OF THE CENTRALESUPÉLEC ENGINEER

The CentraleSupélec engineering curriculum offers its students many opportunities to personalize their course and build their professional project. 9 key competencies should be acquired at the end of the students' journey, they have been identified as essential for all engineering jobs, whether it is in an industrial company, in services, in finance, in consulting, in research or in starting a company or a start-up, etc.

1

Analyze, design and implement complex systems with scientific, technological, social and economic dimensions

2

Develop broad skills in a scientific or academic field and applied professional areas

3

Act, engage, innovate within a scientific and technological environment

4

Create value for companies and clients

5

Operate and evolve in a diverse, international, inter-cultural environment

6

Function effectively as an accountable and innovative actor in the digital world

7

Persuade

8

Lead a project or team

9

Think and act as an honest, ethical, accountable engineer, taking into account environmental, social and societal dimensions

Illustrations: Astrid Cornet

MAJORS

The curriculum is partially organized around 8 majors, representing each a promising scientific or professional sectors:

- In the 3rd year, each of these majors is organized into several concentrations falling under one of the specialization areas offered to students
- In the 1st and 2nd years, the majors are covered by the Engineering Challenge Terms

To guarantee the generalist aspect of the curriculum, the courses in the 1st and 2nd year are very diverse. The majors only define the Engineering Challenge Term and the Challenge Weeks.

You are exposed to complex problems in a specific engineering field from the semester 5. In the following semesters, you'll explore other majors in the framework of the Engineering Challenge Weeks.

THE 8 MAJORS (AREA SPECIALIZATIONS) & THEIR CONCENTRATIONS

Civil Engineering and Transportation

- Civil and Urban Engineering
- Aerospace and Transport Systems

Design and build objects related to transportation, material infrastructures and buildings: aerospace vehicles and devices, land vehicles, large structures, buildings.
Addressing issues related to the design and construction of these structures, at all scales and on different levels:

- Mechanics & materials (behavior, resistance, durability...)
- Energetics (electricity, combustion...)
- Interactions with the environment (flows, thermal, urbanism...)

Energy

- Energy Resources
- Power and Energy Grids
- Energy efficiency
- Sustainable Energy Systems

Responding to the challenges of the energy and climate transition:

- Which energy sources?
- How to produce, convert, store, transport and use energy?
- Scarcity of resources, cost and non-degradation of the environment, technical and economic regulation, other human factors (acceptability, legality).

Develop specialized skills in terms of energy source or production/conversion/distribution process (energy networks in particular).

Large-Scale Interactive Systems

- Control Engineering
- Design and System Sciences
- Supply Chain and Operations Management

Large complex, hybrid, large-scale, cooperative or automated systems, including enterprise systems (and processes) and the digital transformation of enterprise systems.

Target skills:

- Engineering of complex systems
- Design/driving of automated and cooperative systems for industry and services, including advanced control laws
- Planning, optimization and performance management
- Management of material and immaterial flows

Computer Science

- Artificial intelligence
- Software science
- Design of Computing Platforms
- Cybersecurity

Design and develop computer systems along 7 axes:

- Software engineering and computer development
- AI and machine learning
- Architecture and information systems; enterprise IT
- Embedded and real-time computing
- Digital development - digital business, digitization of the business, of the value proposition
- IT security / cybersecurity
- Information and massive data management

Mathematics and Data Science

- Information and Data Sciences
- Mathematics, Modeling, Financial Engineering
- Information and Data Sciences

Master the most advanced mathematical tools to answer the problems of modeling, data processing, and information encountered in all industry and services sectors.
Main areas of study:

- Modeling, optimization and digital simulation of complex systems
- High-performance simulation
- Information processing (in particular signal processing) and visualization
- Data science, Big Data and Machine Learning
- Financial mathematics

Physics and Nanotechnology

- Photonics and nano-systems Engineering
- Quantum Engineering

Take up industrial or scientific challenges, which either exploit the fundamental principles of physics or discover and understand new ones. This major will enable engineers to design and develop new solutions for information processing, energy storage and exploitation, sensors and smart networks, medical diagnosis and therapies...
Axes:

- Materials, nanomaterials, advanced materials (especially for electronics, optics and biomedical)
- Information and energy processing (including photonics)

Communicating Systems and Internet of Things

- Information and Communication Engineering
- Digital and Living
- Electronic Engineering

Design heterogeneous, flexible, cooperative, high-tech and distributed intelligence processing and communication systems (telecommunication infrastructure networks, networks of connected objects, dispersed and mobile systems, confined systems...).

Multi-scale problems, intrinsically multidisciplinary with technological (electronics, electromagnetic compatibility, etc.), economic, regulatory and societal components.

Living - Health/Environment

- Environment and sustainable production
- Healthcare and biomedical services

The engineering sciences join the life sciences.

- Health Engineering: to train engineers who will be able to meet all the challenges of the transformation of health; and in particular: Data for health: epidemiology, predictive/individual medicine, medical imaging.
- BioTech: Environment and sustainable production as an anchor and process development for the agri-food industry.

Paris-Saclay	Paris-Saclay	Metz	Rennes

EDUCATIONAL ACTIVITIES

The semesters are organized in:

#1 - ACADEMIC TERMS (SG): a set of educational activities that are often elective courses, over a period of 6 to 8 weeks. They allow students to acquire the necessary prerequisites to enter an Engineering Challenge Term by offering a choice of elective courses allowing students to deepen their knowledge in or explore new subjects.

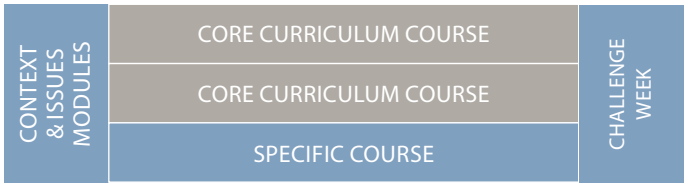
#2 - ENGINEERING CHALLENGE TERMS (ST): a set of courses in the framework of an engineering problem. They aim at:

- Addressing the chosen problem with a holistic approach using the appropriate knowledge and skills
- Highlighting the links between the courses
- Progressing in the construction of one's career path

THE THEMES are:

- ST2 = Modeling
- ST4 = Information
- ST5 = Functional modeling and Regulation
- ST7 = Optimization

THE TYPICAL STRUCTURE OF A ST:



- The Context & Issues Modules allow students to become familiar with the engineering issues addressed in the ST through introductory lectures, round-tables, and an introduction to the cases economic, social and geopolitical contexts.
- The core curriculum courses are the same for all students, regardless of the ST subject chosen.
- The Specific Course is proposed in the major in order to clarify the theme developed in the sequence and give the students the necessary tools to carry out the challenge week.
- The Challenge Week (EI) responds to an engineering problem of interest to a client/partner participating in this course. It is multidisciplinary and it takes into account the human and economic dimensions. The EI presents the characteristics of a complex system: multi-scale, multi-agent, emergent properties.

Several Challenge Weeks are offered within the same Engineering Challenge Term.

SANDWICH WEEKS

In the 1st and 2nd years, these blocks of one to two weeks offer to students short and intense professionalizing group activities, linked to the construction of their training project or their professional project.

The sandwich weeks are linked to the development of specific skills: problem solving, entrepreneurship, project management, computer programming, etc.

In 1st Year:

- Introductory period
- Coding Weeks (80 WLH, end of SG1)
- Start-Up Week (30 WLH, end of ST4)

In 2nd Year:

- Business Game / Climate Science course (before ST5)
- HSS Electives, Experimental Electives (SG6, SG8)

In 3rd Year:

- Professional focus options periods

WORKSHOPS

THE ENGINEER PRACTICE WORKSHOPS (API) have been designed to help students move from an academic to a professional frame of reference and to develop these critical skills for engineers:

- Understanding major societal issues
- Posing a problem
- Teamwork
- Creativity
- Managing complex projects
- Communication, knowing how to convince
- Working in an intercultural context
- Developing leadership skills
- Thinking and acting ethically

The APIs are linked to the projects in Semesters 6 to 8.

THE PROFESSIONAL PROJECT WORKSHOPS (APP) are designed to help students build their professional projects and adapt their academic path for that. They also aim to prepare them for their entry to the professional world (interviews with engineers, discovering companies and professions, networking, CVs, etc.).

Regular one-to-one meetings with a dedicated coordinator enable each student to receive support during their first two school years, mainly to discuss their professional questions.

PROJECTS IN 1ST, 2ND AND 3RD YEAR

The projects are designed to work on 2 main objectives:

1. Discovering the functioning of a team and acquiring experience in conducting a professionally-oriented project.
2. Setting up a work organization to achieve a large-scale project (publication, competition/challenge, software, demonstrator, innovative solution, etc.) whose value will be identified by all stakeholders.

These projects are grouped into Project Poles, whose managers coordinate the subjects, supervision, possible contributions and evaluation.

CentraleSupélec has 24 Project Poles covering all of the school's themes. They propose projects to 1st and 2nd-year students, and some of them can provide resources for projects carried out by students. The majority of these projects are sponsored by an external partner acting as client for the project.

PROJECT POLES

Student Union Projects	MediaScience (Design for scientific and technical outreach)
City Faber Lab (Sustainable construction and territories	Mathematical modeling of complex systems
Cubesats (nano-satellites)	Agile and Responsible Economic Mutations
Data Science	New Energy Concepts
Research Training	Production, Supply Chain & Opérations
Student Union Digital Projects	Robotics
Engineering for the Environment	Biotechnology and Health
Educational Innovation and EdTech	Smart & Secure Life
Artificial Intelligence	Control & Optimization
IoT (Internet Of Things)	Tech For Good & Design Thinking
Makers (Design and prototyping	Ecological and Social Transition
Energy Systems Management	Smart Vehicles

MODERN LANGUAGES

Graduation Objectives:

- Master three modern languages, including French and English

MODERN LANGUAGES TAUGHT AT CENTRALESUPELEC

- Arabic
- Chinese
- English
- FLE (French as a Foreign Language)
- German
- Hebrew
- Italian
- Japanese
- Portuguese
- Russian
- Spanish
- Swedish

ZOOM ON FRENCH AS A FOREIGN LANGUAGE (FLE)

CentraleSupélec offers French language courses for non-natives with different entry-levels. The courses are mandatory for Double Degree students, they are expected to have a B2 level in French by the end of their journey at CentraleSupélec.

SPORTS

SPORTS OFFER

- Athletics
- Rowing
- Badminton
- Basketball
- Boxing,
- Cheer-leading,
- Modern dance
- Climbing
- Fencing
- Soccer
- Handball
- Field Hockey
- Judo / Jiu-jitsu
- Cross training
- Swimming
- Rugby
- Squash
- Tennis
- Table tennis
- Volleyball

The practice of sports is mandatory at CentraleSupélec. You choose a non-competitive sports activity (EPS), or a competitive sports activity (AS) supervised by a CentraleSupélec teacher, in partnership with the French Federation of University Sports (FFSU).

PLAGIARISM & ACADEMIC INTEGRITY

Your teachers can use Compilatio plagiarism detection software to check the academic integrity of their students' work. They have access to an internal database of CentraleSupélec's student work (homework, internship reports, feedback notes, etc.) and numerous external sources. Compilatio will soon be equipped with a feature for detecting text produced by generative AIs such as ChatGPT: https://www.compilatio.net/ia-detecteur-info

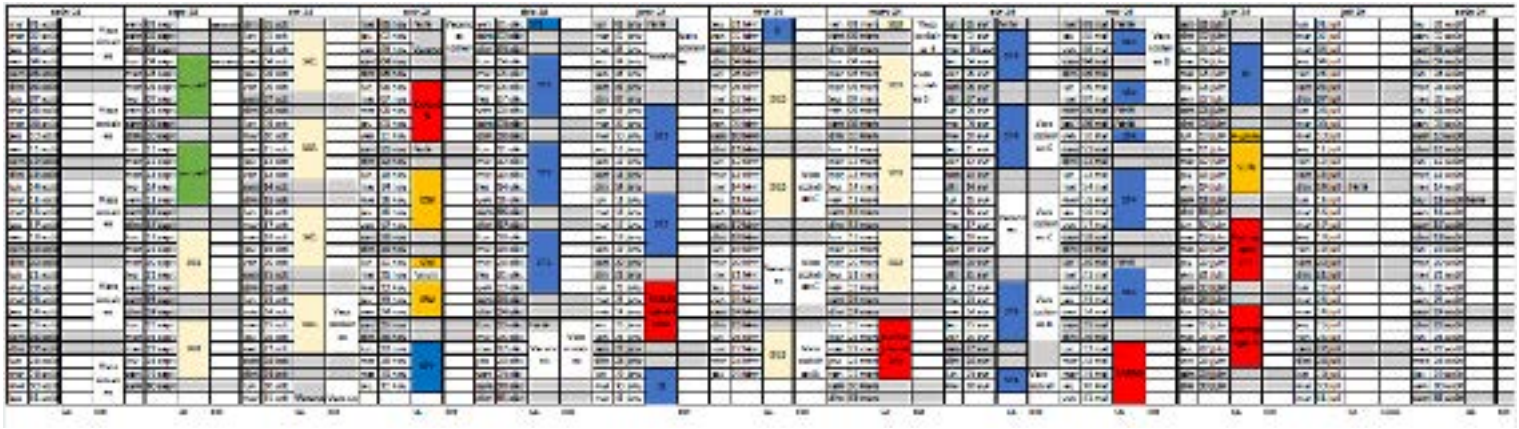
Don't hesitate to use it to:

- Identify what plagiarism is
  Plagiarism is the act of presenting someone else's work as your own. And you can also commit plagiarism in the following cases: graphic illustrations, translation, paraphrasing, self-citation, anonymous sources, and primary and secondary sources.
- Understand how to avoid plagiarism
  Compilatio Studium lets you quickly identify the sources used to construct your assignments. You can then check for plagiarism in your production to see if you've credited all your borrowings with proper referencing and citation practices

Find out more: https://www.compilatio.net/studium

P2024

PLANNED SCHEDULE



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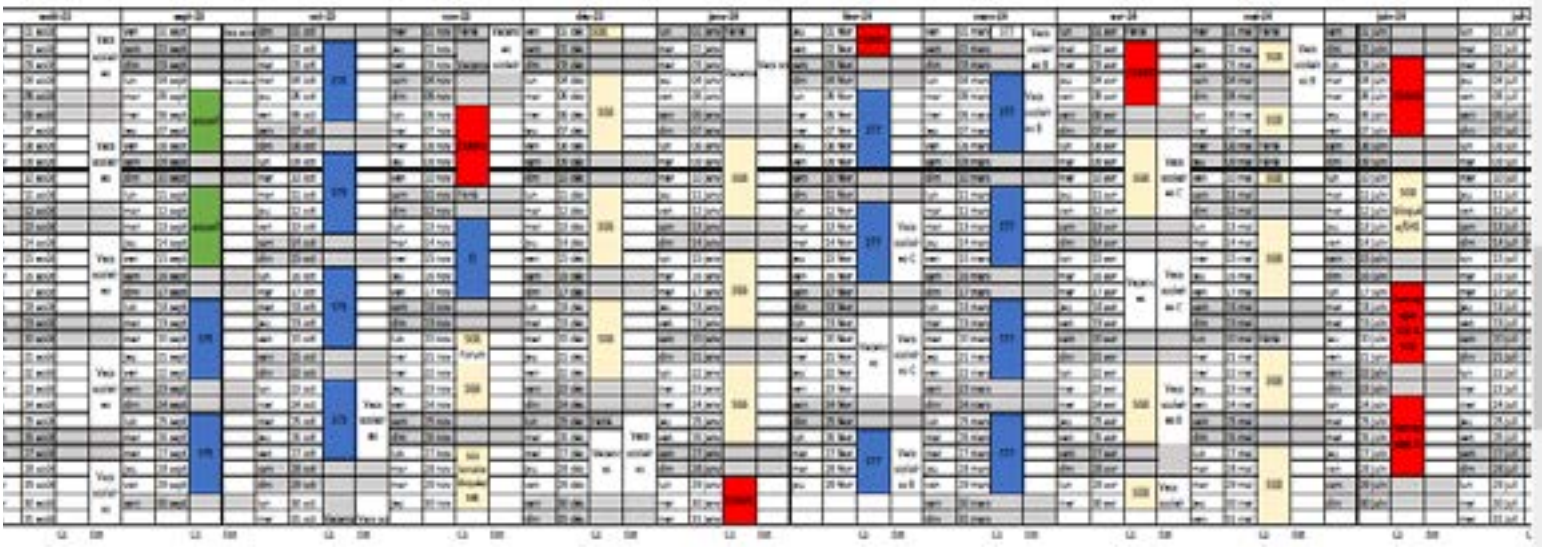

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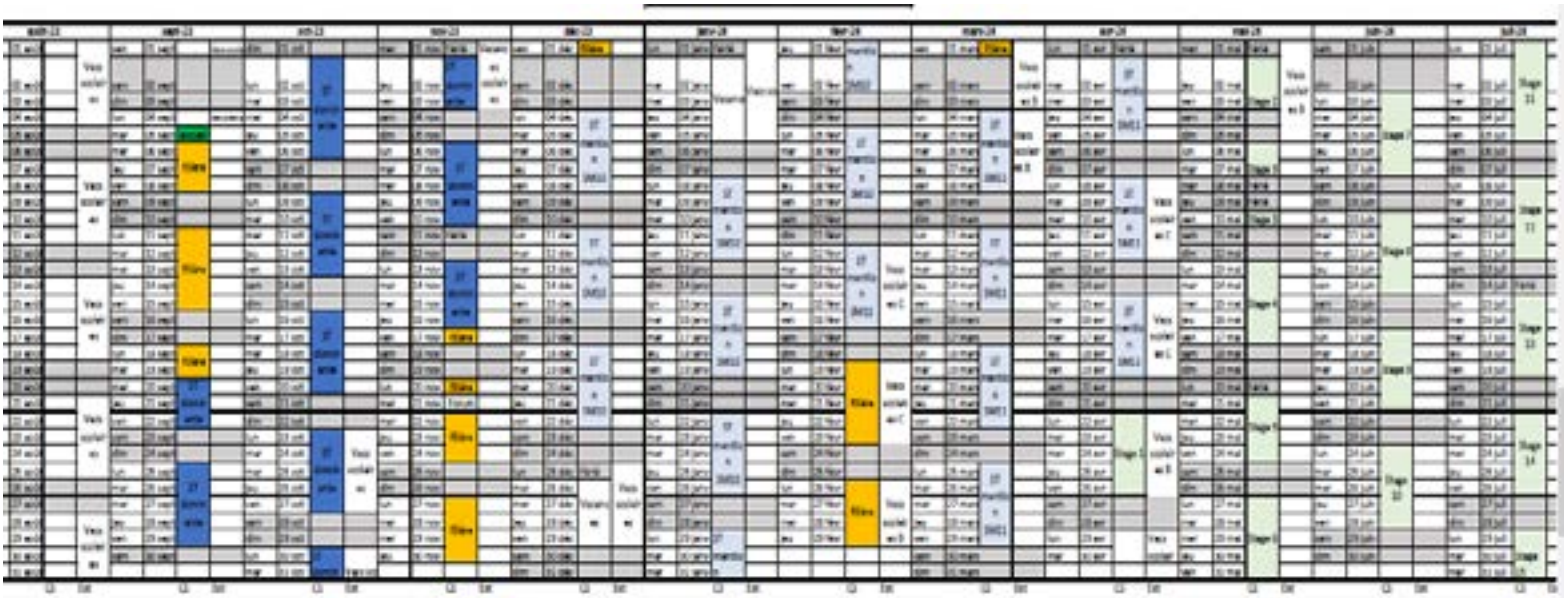
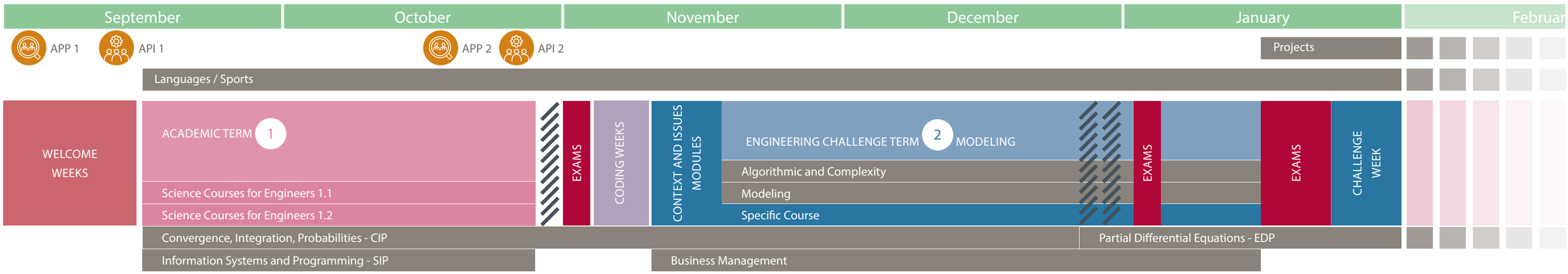


1ST YEAR – 1ST SEMESTER (S5)

The first year of the CentraleSupélec engineering curriculum will address two major themes, Modeling and Information, via a dedicated course offering in the two Engineering Challenge Terms, ST2 and ST4.

It will also allow you to reflect on the construction of your academic project (positioning in thematic courses, choice of international mobility, etc.) and your professional project (workshops, first projects, etc.).



S5 TU

Fundamental Sciences & Engineering Sciences:

- Science Courses for Engineers
- Information Systems and Programming
- Coding Weeks
- Convergence, Integration, Probabilities

Engineering Challenge Term 2 Modeling:

- Context and issues modules
- Algorithmic and Complexity
- Modeling
- Specific Course related to the topic of the Engineering Challenge Term
- Challenge Week

Professionalization:

- Engineer practice workshops
- Professional project workshops
- Business management

Languages:

- Language and culture courses

SEMESTER 5 CORE CURRICULUM & SEMESTER-LONG COURSES:

FUNDAMENTAL SCIENCES

- Convergence, Integration, Probabilities
- Information Systems and Programming
- Partial Differential Equations
- Algorithmic and Complexity
- Modeling

BUSINESS SCIENCES

- Business Management

S5 WORKSHOPS

APP 1 - INTRODUCTION TO ENGINEERING SKILLS

APP 2 - FIRST STEPS IN BUILDING A PROFESSIONAL PROJECT

API 1 - A TEAM ENGINEERING CHALLENGE
Project management - Group dynamics

API 2 - CLIMATE DAY
Understanding the phenomena of climate change with the Climate Fresco and a carbon footprint and a carbon footprint.

THE CODING WEEKS are a 2-week (2 x 4 days) programming mini-bootcamp that offers a hands-on learning of the developer's methodologies and tools.

Program:

- Week 1: work in pairs on a typical project, very guided, to increase skills
- Week 2: work in groups of 4 or 5 on a free project on a given theme, coached and assisted by 3rd year students
- Software Craftsmanship = MVP – Agility – Tests – User feedback
- Git, Stackoverflow, group messaging…
- Competitive programming, challenges…
- Projects on the 3 campuses

Goal: from the idea to the Minimal Viable Product (MVP)

1ST YEAR - 2ND SEMESTER (S6)

START-UP WEEK

Accompanied by coaches, you will be asked to present your business creation ideas in a very advanced form, whether it be in the search for feasibility or the presentation of the project.

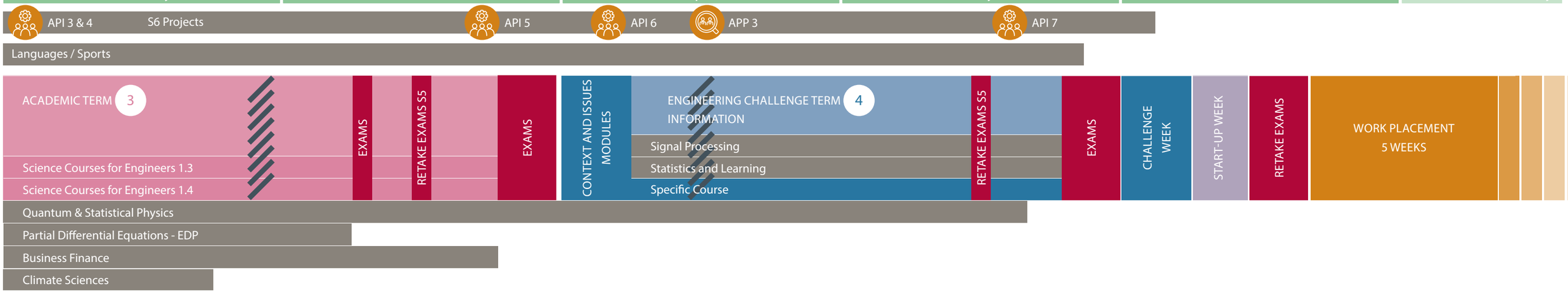
Basic principles of business creation:

- Formulation of a value proposition
- Market analysis
- Formalization of the business model
- Definition of a business plan

Teaching methods:

- Teamwork
- Appropriation of the pitch technique
- 142 teams of 6 students = 22 groups
- 2 to 3 coaches per group

Based on the theme chosen beforehand (in various sectors: Tech for Good, health/biotech, transport/mobility, environment/climate, sport ...) and in the continuity of the elements seen in the course of business management, divided into teams you will have four days to convince of the value of a project and be an actor of it.



S6 TU

Fundamental Sciences & Engineering Sciences:

- Science Courses for Engineers
- Quantum & Statistical Physics
- Partial Differential Equations
- Climate Sciences

Engineering Challenge Term 4 Information:

- Context and issues modules
- Signal Processing
- Statistics and Learning
- Specific Course related to the topic of the Engineering Challenge Term
- Challenge Week

Professionalization:

- Start-Up Week
- S6 project
- Business Finance
- Engineer practice workshops
- Professional project workshops

Languages:

- Language and culture courses

SEMESTER 6 CORE CURRICULUM & SEMESTER-LONG COURSES:

FUNDAMENTAL SCIENCES

- Partial Differential Equations
- Quantum & Statistical Physics
- Signal Processing
- Statistics and Learning
- Climate Sciences

BUSINESS SCIENCES

- Business Finance

STUDENTS' CIVIC COMMITMENT

From the start of the 2023 academic year, during the first two years of their studies, all students must carry out a solidarity, volunteer or civic activity related to diversity, inclusion, gender equality, disability, humanitarianism, etc.

This civic commitment, lasting at least 20 hours, must occur outside the engineering curriculum.

Students will be able to get involved:

- In CentraleSupélec's internal student associations, according to a list approved by the school;
- In an external association selected from the ARUP (Associations Reconnues d'Utilité Publique) list;
- Within the framework of missions proposed and validated by the Center for Diversity and Inclusion, the disability referent, the gender equality referents, the Diagonale Paris-Saclay, and the Institut Villebon Georges Charpak.

S6 WORKSHOPS

API 3 - POSING THE PROBLEM

Know how to pose a problem, establish robust hypotheses, determine and use relevant orders of magnitude, and manage uncertainty and risk.

API 4 - PROJECT MANAGEMENT

API 5 - CREATIVITY

Group creativity methods (brainstorming, inversion, bi-sociation, analogy...

API 6 - CREATING VALUE & TEAM DYNAMICS

Project review, risk analysis.

API 7 - COMMUNICATION & HOW TO CONVINCE

Know how to structure a convincing presentation, public speaking, and increasing impact in oral communication.

APP 3 - UPDATE ON THE PROFESSIONAL PROJECT AND ENGINEERING MEETINGS

WORK PLACEMENT

Students must complete a minimum of 5 weeks of continuous internship in a company between the first and second years. The work placement provides the opportunity to develop the knowledge necessary for a thorough understanding of the operator's job and its crucial role as the foundation of any product or service production process. To be validated, this work placement must, in addition to the conditions on the mission's nature, place the student in a context conducive to acquiring the required knowledge. In particular, this demands the presence of a local hierarchy and a sufficient number of operators performing the same task.

Fields of activity: manufacturing, maintenance or logistics.

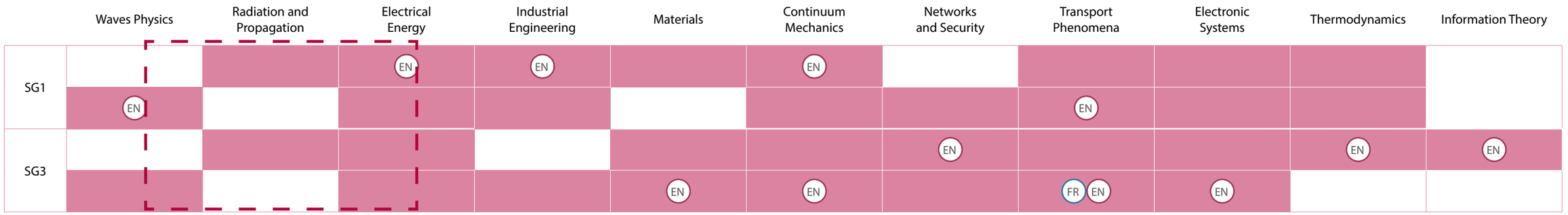
Pedagogical objectives:

1 - Acquisition of knowledge
- Of the company, view of the executive function;
- Of the production function: manufacturing, logistics, handling, maintenance - learning about human relations in a professional environment
- Experience of an executive position;
- Taking a step back by keeping a training log.

2 - Highlighting achievements in writing and orally
- Production of an internship report;

Humanitarian missions are not intended to validate a work placement. However, a derogatory system allows a development aid mission to replace the work placement for a maximum of 10% of the 1st year students.

SCIENCES COURSES FOR ENGINEERS - 1ST YEAR



EN Courses taught in English

ENGINEERING CHALLENGE TERM 2 SUBJECTS (ST2) 1ST YEAR

- Medical Robotics
- Telecommunication Systems
- Modeling of Strategic Interactions Through Games
- Energy Transition
- Modeling, Simulations and Experiments for the Design of Vehicles and Structures EN
- Earth Observation for our Environment and Safety
- Viral Propagation EN
- Bioengineering: Produce, Protect, Repair

ENGINEERING CHALLENGE TERM 4 SUBJECTS (ST4) 1ST YEAR

- Systems Monitoring and Prognostics for Risk Management EN
- Big Data & Health: from Data Acquisition to Decision Making
- The IoT (Internet of Things) and Related Information Processing EN
- Data and Statistics in Finance EN
- Adapting infrastructures to climate change EN
- Energy and Climate
- Black swans detection in particle physics & cosmology EN
- Data@Web: Web Data Intelligence “Value Creation around of Web Data”

EN All the lectures of the Engineering Challenge Term are in English

2ND YEAR - 1ST SEMESTER (S7)

The 2nd year of the CentraleSupélec engineering curriculum will address two major themes, Functional Modeling and Regulation and Optimization, via a dedicated course offering in the two engineering challenge terms, ST5 and ST7.

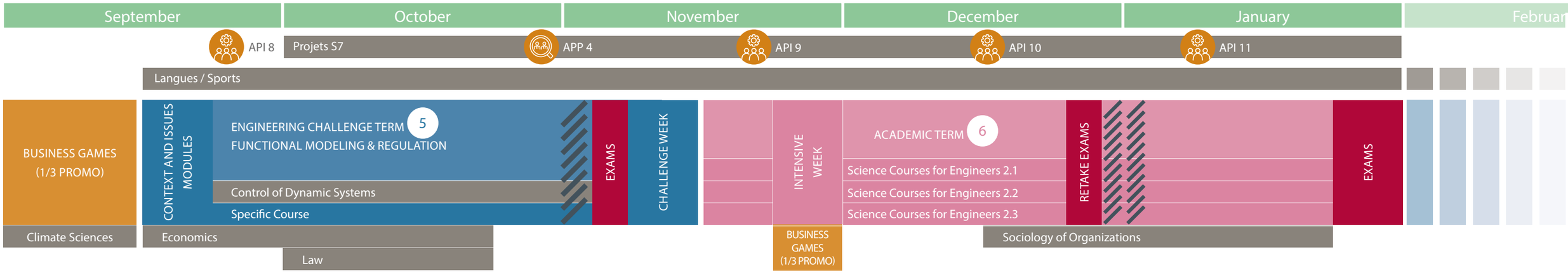
BUSINESS GAMES offer a practical, playful and synthetic approach to economics, management and psycho-sociology. They provide an experience of collective decision-making, interdependence and team organization, conflict management, role-taking and personal positioning in a group.

Objectives:

- Discover the company and its main functions;
- Learn about management and accounting;
- Experience and become aware of the processes at work in a work team (decision making, organization, etc.);
- Analyze your contribution to the work group.

Modalities:

- Teamwork;
- Serious game.



S7 TU

Sciences:

- Science Courses for Engineers 2.1
- Science Courses for Engineers 2.2
- Science Courses for Engineers 2.3
- Economics
- Sociology of Organizations)

Engineering Challenge Term 5
Functional Modeling & Regulation:

- Context and issues modules
- Control of Dynamic Systems
- Climate Sciences
- Specific course
- Challenge week

Professionalization:

- Business games
- Law
- Engineer Practice workshops
- Professional Project workshops
- S7 Project

Languages:

- Language and culture courses

SEMESTER 7 CORE CURRICULUM & SEMESTER-LONG COURSES:

ENGINEERING SCIENCES

- Control of Dynamic Systems
- Climate Sciences

BUSINESS SCIENCES

- Economics
- Law

HUMANITIES AND SOCIAL SCIENCES

- Sociology of Organizations

S7 WORKSHOPS

APP 4 - RESUME, COVER LETTER, PITCH

API 8 - LEADERSHIP
Leadership and self-awareness.

API 9 - ENERGY TRANSITION - 2 TONS WORKSHOP

API 10 - INTERCULTURALITY
Open up to others, know how to adapt to a diverse environment.

API 11 - ETHICS
Acting ethically, understanding the consequences of one's choices.

THE INTENSIVE WEEK organized at the end of November, offers three teaching types:

Five courses linked to SG6 electives:

- Understand the blockchain
- Communicate on sustainable research projects
- Design your way
- Ethics & responsibility
- Artificial intelligence in global health (Paris-Saclay, Metz, Rennes)

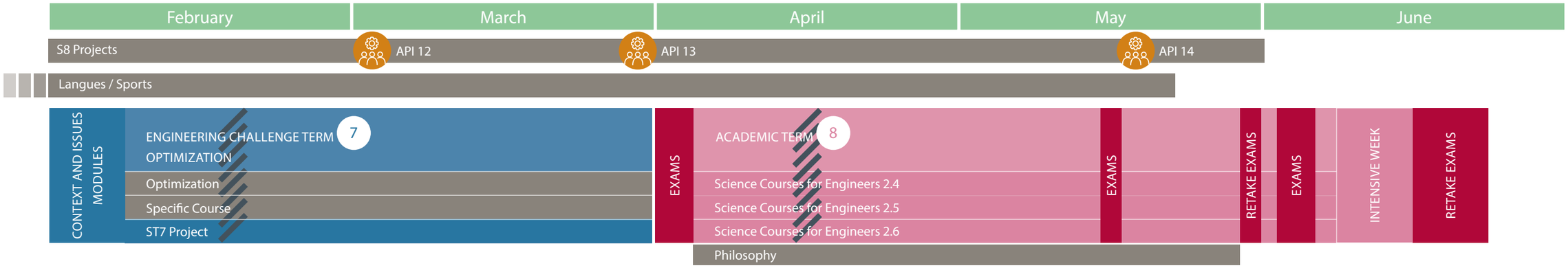
Seven experimental courses:

- Semiconductor Innovation
- Bridge Building Challenge
- Physics Experimental Work
- Audio Signal Processing
- Discovery of Software Defined Radio
- Immersion Week in Biomaterials
- Physics of electrical discharges (cold plasma)

About fifteen courses in the humanities and social sciences divided into four main areas:

- Individuals - work - organizations
- Societal issues
- Science, technology, society
- Innovation, arts and creativity

2ND YEAR - 2ND SEMESTER (S8)



S8 TU

Sciences:

- Science Courses for Engineers 2.4
- Science Courses for Engineers 2.5
- Science Courses for Engineers 2.5
- Philosophy
- HSS

Engineering Challenge Term 7 Optimization:

- Context and issues modules
- Optimization
- Specific course
- ST7 project

Professionalization:

- S8 project
- Engineer practice workshops
- Professional Project Workshops

Languages:

- Language and culture courses

S8 WORKSHOPS

API 12 - PROJECT COACHING

API 13 - PROJECT COACHING & TEAM DYNAMICS

API 14 - COMMUNICATION & HOW TO CONVINCE

SEMESTER 8 CORE CURRICULUM & SEMESTER-LONG COURSES:

ENGINEERING SCIENCES

- Optimization

HUMANITIES AND SOCIAL SCIENCES

- Philosophy

THE INTENSIVE WEEK organized

at the beginning of June, offers three teaching types:

Five courses linked to SG8 electives:

- Web and mobile application development
- Engineering, Ethics and Responsibility
- Purchasing management
- Risk Analysis (Rennes)
- Public Finance (Metz)

Seven experimental courses:

- Semiconductor Innovation
- Bridge Building Challenge
- Physics Experimental Work
- Audio Signal Processing
- Discovery of Software Defined Radio
- Bio mechanics & bio materials
- Contactless 3D scanning

Courses in the humanities and social sciences divided into four main areas:

- Individuals - work - organizations
- Societal issues
- Science, technology, society
- Innovation, arts and creativity

HSS ELECTIVES COURSES

These electives have been designed to help students understand better and contextualize the technical, managerial, and organizational problems with which engineers are confronted in the workplace, their direct links with the dynamics of society, as well as the normative frameworks, worldviews, and economic, ethical, and societal stakes of the various actors involved (employees, citizens, scientists, and institutions).

Four main areas:

Individuals - work - organizations | Societal issues | Science, technology, society | Innovation, arts and creativity

Expertise acquired:

- Reflexive ability is the ability to apprehend problems both in their specificity and insertion in an environmental and societal context.
- Integrate into one's work the controversies that develop around scientific and technical advances and innovations, the growing role of the users of these innovations in these controversies, and/or the very strong influence of economic, social, political and cultural contexts on the development of these innovations.
- Critical thinking - Development of analytical, argumentation and synthesis skills

Main concepts covered:

- Power, democracy, responsibility
- Political/moral articulation
- State/society
- Ethics, values, morals
- Truth, proof, epistemic authority
- Society, individual, identity, social link, individual/collective articulation
- Technological progress/social progress
- Work
- Social innovation

2ND YEAR ELECTIVE COURSES

PARIS-SACLAY

- Advanced Mechanics for Civil Engineering: "Building tomorrow"
- Advanced Probabilities
- Advanced Statistics
- Algebra and Cryptology
- Applications of statistical & quantum physics to information science
- Architecture and design of digital systems
- Artificial Intelligence
- Artificial Intelligence and Global Health
- Audio Signal Processing
- Biomechanics & biomaterials
- Bridge Building Challenge
- Building the city - town planning, architecture and engineering
- Chemical Engineering: application to environment and sustainable production
- Cloud computing & distributed computing
- Communicating Sustainable Research Projects
- Communications Theory
- Contactless 3D scanning
- Corporate finance and Law
- Design your way
- Digital image processing
- Discovery of Software Defined Radio
- Distributions and Operators
- Dynamical Multi-Agent Systems. Application to drones formation control
- Dynamical Systems in Neuroscience
- Economics of decarbonized transport systems
- Economics of Growth and Innovation
- Electrical Energy Conversion for Renewable Energy Sources & Electromobility
- Electronics for biomedical and communication applications
- Embedded space systems
- Energy Conversion
- Environmental economics, energy and sustainable development
- Ethics and responsibility
- Experimental Physics Work
- Exposure of people to electromagnetism and electromagnetic compatibility
- Fluid Mechanics
- Fundamental laws of the Universe - Particle physics, astroparticles & cosmology
- Genomics & synthetic biology in health and industrial biotechnology
- Heat Transfer
- High Performance Computing
- Immersion week in biomaterials
- Integrated MEMS sensors
- Interactive Robotic Systems
- Machine Learning
- Maintenance and Industry 4.0
- Mobile Communication Networks and Services
- Models and Systems for Big Data management
- Navigation & optronics systems for autonomous vehicles & satellites - Real-time technologies
- Nonlinear behavior of materials
- Nuclear Engineering
- Object oriented software Engineering
- Operations and supply chain management
- Organizational and market theories
- Physics of Divided Matter
- Physics of electrical discharges (cold plasma)
- Procurement management
- Public sector professions
- Quantum and Statistical Physics
- Reactive Media
- Renewable Energies
- Scientific Calculation
- Semiconductor Innovation
- Signal compression and denoising
- Simulation of multiphysic couplings with FEM
- Strategy, Marketing and Organization
- Structural Analysis
- Structural Dynamics & Acoustics
- Sustainable innovation
- Theoretical Computing
- Understanding blockchain
- Understanding, optimization & simulation of biotechnological processes
- Web and mobile application development

RENNES

- Advanced computer networks
- Advanced Corporate Finance
- Artificial Intelligence and Deep Learning
- Artificial Intelligence and Global Health
- Bayesian methods for machine learning
- Communication Systems Engineering
- Computer Architecture
- Digital marketing
- Embedded systems and Internet of Things
- Geopolitics of resources and objects
- Intelligent Wireless Access & Experimentation
- Micro-networks: components & control
- Model based design of critical embedded control systems
- Model-based Predictive Control
- Modelica and bond graph: multi-domain modeling, analysis and simulation
- Operating Systems
- Production and Flow Management
- Risk Analysis (InfoSec Program)
- Serious Game
- System programming under Linux and Windows

METZ

- Analysis and processing of audio data (speech and music)
- Artificial Intelligence and Global Health
- Big Data: data gathering, storage and analysis on clusters and Clouds
- Chaos, Fractals and Complexity
- Chemical Engineering: application to environment and sustainable production
- Design of complex electronic systems: from component to heterogeneous system
- Estimation Methods and Introduction to the Modern Coding Theory
- Image processing
- Introduction to Mobile Applications Engineering
- Introduction to multi-tier application development & web services
- Light to understand matter
- Modeling for Systems Engineering
- Programming Efficiently in C++
- Public Finances
- Smart Photonics Systems
- Social and solidarity economy, transitions and socio-economic models
- Transitions and Socio-economic Symbiosis

ENGINEERING CHALLENGE TERM 5 SUBJECTS (ST5) 2ND YEAR

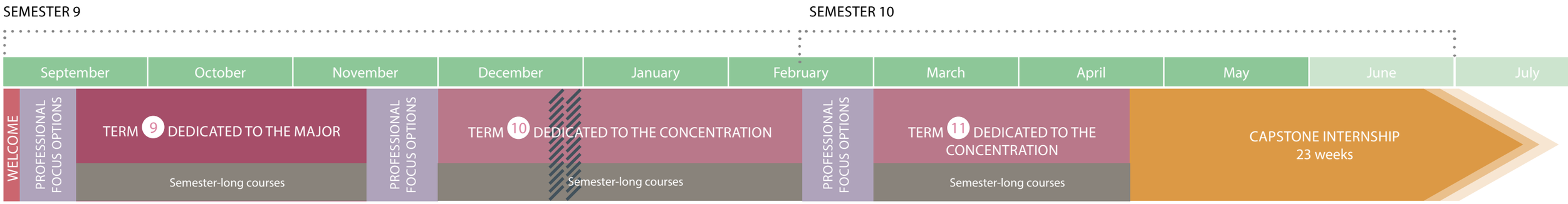
- Piloting and Flight Control in Aeronautics and Space Transportation
- Control of (Bio)Processes for Sustainable Production
- Autonomous and Connected Vehicle
- The Eco-Neighborhood, a Complex System. Sustainable Development & Complex Project Management
- Light and Matter: Development of High Technology Instruments
- Multi-Energy Systems
- Control of Acoustic and Electromagnetic Pollution
- Complex Industrial and Critical Systems with Dominant Software
- Assistance and Autonomy of the Person
- Semi-Autonomous Navigation of Drones
- Smart photonics systems for control and measure (EN)
- Energy Intelligence and smart building (EN)
- Smart and Embedded Systems for Health (EN)
- Modeling and Development of Supervision Software

ENGINEERING CHALLENGE TERM 7 SUBJECTS (ST5) 2ND YEAR

- Stochastic Finance and Risk Modeling (EN)
- Optimization of Network Infrastructure for Smart Cities (EN)
- Circular Economy and Industrial Systems
- Optimization of Passenger Transport Systems
- Optimization and Management of Flows of Complex System
- High Performance Simulation for Footprint Reduction (EN)
- Efficiency of On-Board Energy Systems
- Additive Manufacturing Design (EN)
- Source Separation for Optimal Signal Processing
- Physical Neuro-Inspiratory Systems for Information Processing (EN)
- Energy Transition in Isolated Sites (EN)
- Digital Technology at the Service of the Human Factor (EN)

(EN) All the lectures of the Engineering Challenge Term are in English

3RD YEAR



The third year takes place on the Paris-Saclay, Rennes or Metz campuses.
It is organized around:

- Majors that segment the sectors in which graduates are called upon to practice upon graduation. Each major is itself sub-segmented into Concentrations.
- Professional Focus Options that segment the professional sectors in which graduates are expected to practice upon graduation.

THE 8 MAJORS (AREA SPECIALIZATIONS) & THEIR CONCENTRATIONS

Civil Engineering and Transportation	Energy	Large-Scale Interactive Systems	Computer Science
Civil and Urban Engineering	Energy Resources	Control Engineering	Artificial Intelligence
Aerospace and Transport Systems	Power and Energy Grids	Design and System Sciences	Software Science
	Energy Efficiency	Supply Chain and Operations Management	Design of Computing Platforms
	Sustainable Energy Systems		Cybersecurity

Mathematics and Data Science	Physics and Nanotechnology	Communicating Systems and Internet of Things	Living - Health/Environment
Information and Data Sciences	Photonics and nano-systems engineering	Information and Communication Engineering	Environment and sustainable production
Mathematics, Modeling, Financial Engineering	Quantum Engineering	Digital and Living	Healthcare and Biomedical Services
Information and Data Sciences		Electronic Engineering	

THE PROFESSIONAL FOCUS OPTIONS of the 3rd year correspond to 8 large families of promising professions in which the young graduates will be able to occupy their first position:

Research	Operational Management
Innovation and Intrapreneurship	Analysis and Decision Aid
Design of Complex Systems	Sales and Business Development
Management of Large Projects	CentraleSupélec Entrepreneur

Paris-Saclay	Paris-Saclay	Metz	Rennes

CAPSTONE INTERNSHIP

To complete your 3rd year and obtain your diploma, you must complete a 23-week internship in a company or research laboratory in an engineering-level position.

You will write a thesis based on the experience acquired during this internship.

The choice of subject is validated, after consultation with the company's internship supervisor, by the heads of the concentration and the focus option, who each designate a teacher responsible for the pedagogical follow-up of the project and who guarantees CentraleSupélec excellence.

These teachers will remain in contact with you and inform the heads of the concentration and the focus option of the project's progress. The Dean of Studies is immediately alerted in the event of a problem.

You send the thesis to the heads of the concentration and focus option and then defend it before a jury (the internship jury) composed of at least two teachers and a company manager and chaired by the head of the concentration or the focus option or their representatives.

If the thesis is not deemed satisfactory, the heads of the concentration or focus option, or their representatives, may jointly decide to postpone the defense

KEY ELEMENTS OF THE INTERNSHIP:

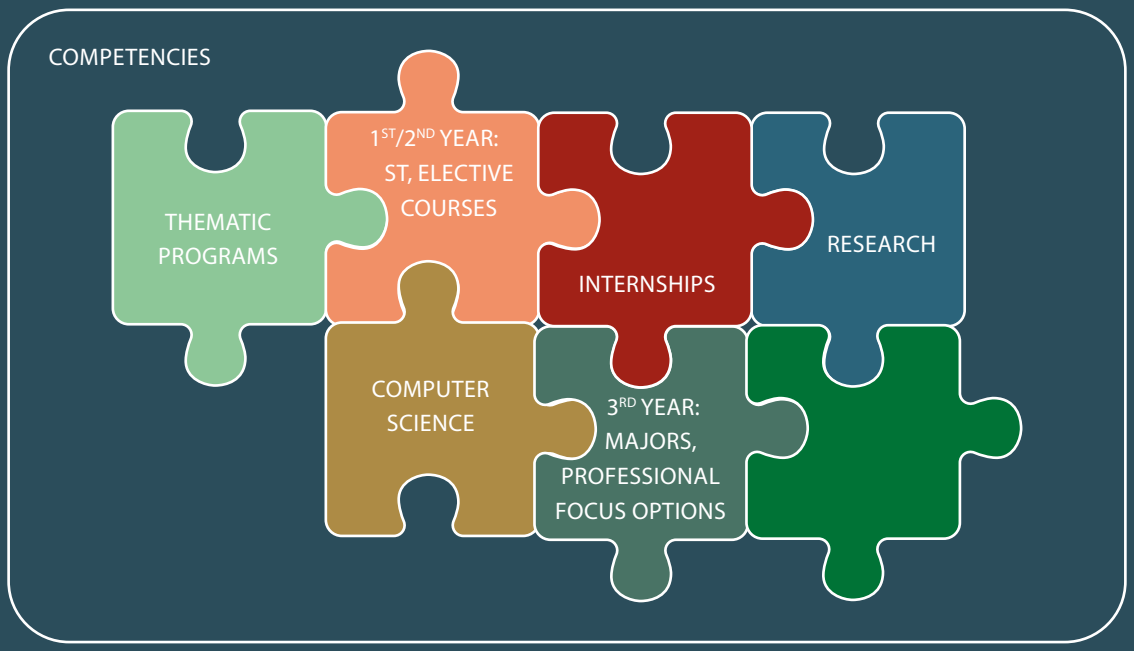
- Duration: 23 weeks
- In a company or in a laboratory
- In an engineering position
- In relation with the Concentration followed
- Validation:
  - Submission of a thesis
  - Defense in front of a jury

#3

CUSTOMIZE YOUR DEGREE TRACK

Apprenticeship, international mobility, diplomas complementary to the engineering program, thematic courses dedicated to research, business creation, computer science and cybersecurity, gap year...

The CentraleSupélec engineering curriculum offers students who wish to do so increased possibilities for personalization via specific courses. Each student can thus explore different facets of the engineer and forge a project in their own image.



BUILD YOUR PROFESSIONAL PROJECT:

1st Year	Professional project workshops Individual meetings	Interviews with Engineers
		Career panels
		Meetings with engineers
2nd Year		Gap Year Forum
3rd Year	Professional Focus Options Capstone internship	

THE RESEARCH PROGRAM CS+R

The Research Training Project Pole enables around 20% of students to carry out long-term research projects during their studies. For those who wish to go even further, the School offers the CS+R Research Program, based on completing a research project immersed in a laboratory for three years and offering specific activities.

Comprehensive in terms of professional development, acquisition of business know-how, scientific culture and expertise, this pathway leads engineering students to a level of competence equivalent to the end of a 1st-year doctorate.

Each student carries out an ambitious research project, progressively over three years, under the guidance of a scientific mentor.

Program objectives:

- To offer students with a passion for science and a desire to play a part in creating knowledge an appropriate pathway.
- Lead students naturally towards a doctorate, a diploma recognized for leading major international corporate projects and necessary for an academic career.
- Familiarize students with the research world and help them build a solid professional network.
- Train engineers capable of forging strong links between academic research and the corporate world, a key to successful innovation.

Reminder:

- 3-year program, with annual commitment
- 40 places

Contact:
Bruno Palpant
Head of the program
bruno.palpant@centralesupelec.fr

THE ENTREPRENEURSHIP PROGRAM CS+E

The program:

- is based on a foundation of knowledge that is essential to business creation;
- allows for the integration of international experiences that make sense in the context of business creation;
- ensures a specific coloring to the theme of the student's project;

while maintaining the high standards required to graduate from the CentraleSupélec engineering program.

The program is closely linked to the School's incubator and Accelerator (Paris-Saclay campus and Station F).

Program objectives:

- To offer a program to students who are passionate about entrepreneurship and wish to master the methods and tools to create their own business.

Reminder:

- 2-year minimum commitment
- 40 places

Contact:
Christophe Rittano
Head of the program
christophe.rittano@centralesupelec.fr

THE COMPUTER SCIENCE PROGRAM CS+IS

CentraleSupélec engineering students have the opportunity to follow a two-year in-depth training program in computer security on the Rennes campus.

For students admitted to this program, certain standard pedagogical activities will be replaced by specific activities in respect of the development of the skills displayed by the School.

Program objectives:

- To train CentraleSupélec engineers to be experts of the highest level, capable of understanding and anticipating increasingly complex attacks on the security of computer systems.
- To train those who will be the guarantors of tomorrow's digital data security. Such experts are rare on the job market today, and their recruitment requires very advanced technical tests.

Reminder:

- 2-year commitment, from 2nd Year
- 30 places
- On the Rennes campus

Contact:
Jean-François Lalande
Head of the program
jean-francois.lalande@centralesupelec.fr

KEY THEME: SUSTAINABLE DEVELOPMENT

The UN Sustainable Development Goals (SDGs) mapping in the 1st and 2nd year engineering courses was carried out in 2020. Focusing on six central SDGs, considered essential to the School for the climate, energy, ecological and social transition, it lists the courses that deal with or evaluate one or more of these 6 SDGs. This map will evolve soon to integrate new pedagogical activities, from 1st Year to 3rd Year, that address or assess these SDGs.

Some language courses in 1A and 2A also address or assess these SDGs.

Not listed are the courses that only address the SDGs without really dealing with them.

Core curriculum & semester-long courses						
Business Management 1A					Addressed	
Corporate Finance 1A						Addressed
Economics 2A	Addressed				Addressed	Addressed
Climate Science 2A						Assessed
Engineer Practice Workshops						
API 1A & 2A	Addressed	Addressed	Addressed	Addressed	Addressed	Addressed
Science Courses for Engineers 1A						
Industrial Engineering			Addressed		Addressed	
Materials					Assessed	
Transport Phenomena						Addressed
Thermodynamics		Assessed			Assessed	
Elective Courses 2A						
Model based predictive control - Rennes					Assessed	
Robust electronic and embedded systems - Metz					Assessed	
Renewable Energies		Assessed				
Energy Conversion		Assessed				
Building the city	Assessed	Addressed		Assessed	Addressed	
Chemical Engineering: application to environment & sustainable development		Assessed	Assessed		Assessed	
Design Science		Assessed	Assessed		Assessed	
Strategy, Marketing and Organization					Assessed	
Environmental economics, energy and sustainable development	Assessed	Assessed	Addressed		Assessed	
HSS: Societal issues	Assessed			Assessed		
HSS: Science, technology, society			Assessed	Assessed	Assessed	
HSS: Innovation, arts and creativity	Assessed		Assessed	Assessed	Assessed	
HSS: Individuals - work - organizations	Assessed					
Projects Pole						
P02 City Faber Lab		Addressed	Assessed	Assessed	Assessed	
P04 Data Science						Addressed
P07 Engineering for the Environment			Assessed			
P11 IoT			Assessed	Assessed		
P16 Agile and Responsible Economic Mutations	Assessed		Assessed			
P17 New Energy Concepts		Assessed				
P20 Biotechnology and Health			Assessed			
P21 Smart and Secure Life	Assessed					
P23 Tech For Good and Design Thinking	Assessed					Addressed
P24 Ecological & Inclusive Transition					Assessed	Addressed

KEY THEME: INDUSTRY OF THE FUTURE

LEVERS OF THE "ALLIANCE INDUSTRIE DU FUTUR" REFERENCE SYSTEM

	Advanced production technologies	Connected, controlled and optimized factories and lines/ plots	New economic and social models, strategies and alliances	Connected objects and industrial Internet	New approach to people at work, innovative organization and management	Integrated customer/supplier relationships
Cours SPI 1re année						
			Electrical Energy	Networks ans Security	Industrial Engineering	
Engineering Challenge Term 2 (ST2)						
			Energy Transition			
			Earth Observation for our Environment and Safety			
Engineering Challenge Term 4 (ST4)						
		Systems Monitoring and Prognostics for Risk Management	Energy and Climate	The IoT and Related Information Processing		Digital Transformation and Integrated Engineering Digital Mock-Up and Life Cycle of Structures and Vehicles
Elective Courses 2A						
2.1			Energy Conversion	Integrated MEMS sensors		
2.2		Models and Systems for Big Data management	Quantum and Statistical Physics	Machine Learning		
				New Networking Paradigms		
				Models and Systems for Big Data management		
2.3				Artificial Intelligence and Deep Learning (Rennes)	Strategy, Marketing and Organization	
				Architecture and Design of Digital Systems		
2.4			Renewable Energy	Artificial Intelligence	Operations and supply chain management	
2.5	Biomechanics and Life Materials	Maintenance and Industry 4.0	Environmental economics	Cloud computing and distributed computing	Interactive Robotic Systems	
		Cloud Computing and Distributed Computing	Chemical Engineering: application to environment and sustainable production	From Transistor to Complex Analog System		
				Embedded Systems and Internet of Things		
2.6	Robust Electronic and Embedded Systems	Big Data: data gathering, storage and analysis on clusters and Clouds				
Engineering Challenge Term 5 (ST5)						
	Semi-Autonomous Navigation of Drones	Complex Industrial and Critical Systems with Dominant Software	Intelligence énergétique and smart building			
	Light and Matter: Development of High Technology Instruments		Control of (Bio)Processes for Sustainable Production			
	Autonomous and Connected Vehicle		Multi-Energy Systems			
Engineering Challenge Term 7 (ST7)						
	Additive Manufacturing Design	Optimization and Management of Flows of Complex Systems	Circular Economy and Industrial Systems			
			Efficiency of On-Board Energy Systems			
Project Poles						
	P12 - Makers	P04 - Data Science	P07 - Engineering for the Environment	P04 - Data Science	P18 - Production, Supply Chain & Operations	P02 - City Faber Lab
	P22 - Cyber-Physical Systems		P17 - New Energy Concepts	P10 - Artificial Intelligence	P19 - Robotics	
	P25 - Intelligent Vehicles		P24 - Ecological & Inclusive Transition	P11 - IoT (Internet of Things)		
3rd Year Concentrations						
	Quantum Engineering	Data and information Science	Energy Efficiency	Intelligent Systems and Networks	Design and System Sciences	Construction and Urban Civil Engineering
		Information Systems Architecture	Energy Resources	Mobile, Electromagnetic and Nano-electric Communicating Systems		
				Information Systems Architecture		
	Control Engineering	Software Science	Sustainable Environment and Production	Artificial Intelligence	Supply Chain and Operations Management	Mechanics and Aerospace Engineering
			Energy Network	Cyber Security		
Professional focus options						
•	Research professions					
			Innovation and intrapreneurship		Innovation and intrapreneurship	
			Sales and business development		Operational management	
	CentraleSupélec Entrepreneur					

Approaches the topic (awareness) | Addresses the topic (implementation, further study) | Assessment (validation of knowledge)

Version 2 - September 1st, 2023



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