

GROUPE DES ÉCOLES CENTRALE

# 01

# Introducing the Ecoles Centrale Group

GROUPE DES ÉCOLES CENTRALE

GROUPE DES ÉCOLES CENTRALE




In France

CentraleSupélec

centralelille

CENTRALE LYON

Centrale Méditerranée

CENTRALE NANTES

Overseas

北航中法工程师学院 Centrale Pékin

Centrale CASABLANCA

Mahindra™ University Global Thinkers. Engaged Leaders. | ÉCOLE CENTRALE SCHOOL OF ENGINEERING

# Some figures for the Group...

**14200**
students

(9500 in France)

**950**
Research
Professors

**26**
Research
Centres

**1500**
Doctoral
students

**3000**
Contractual
Teachers
(50% from industry)

**35**
Industrial
Chairs

Bachelor, Master and Doctoral courses



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# The Group’s main mission

« Training Multi-Disciplinary Engineers and Doctors to enable them to use innovation in order to meet the challenges of our society »

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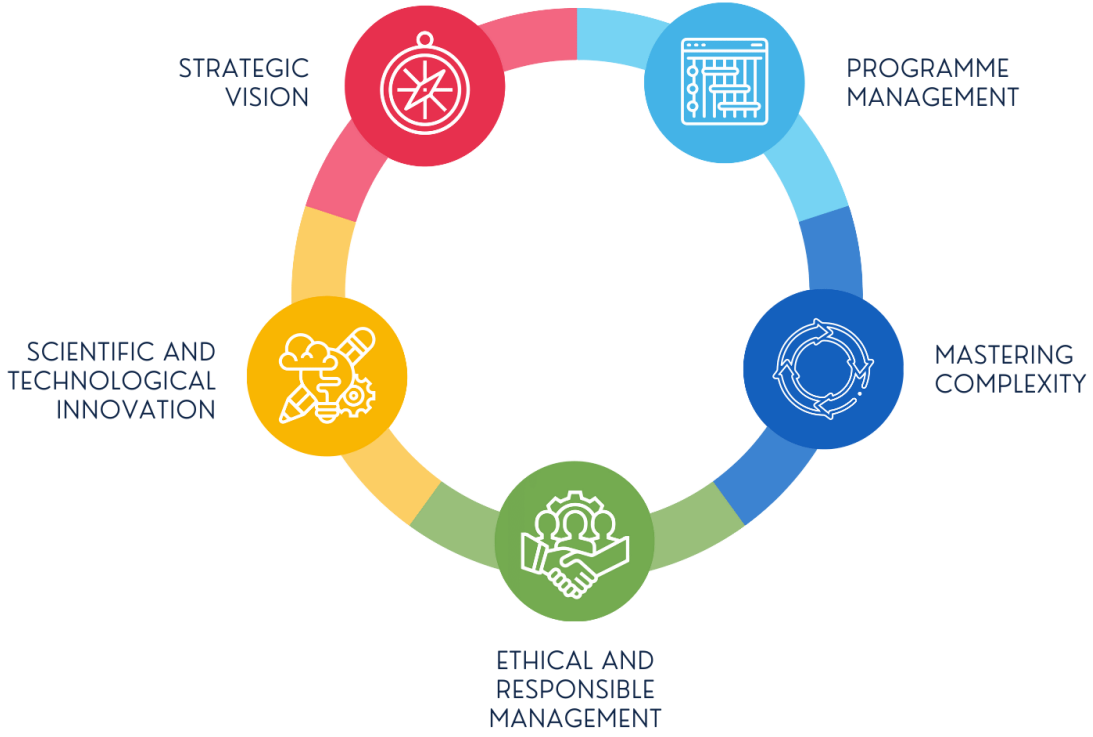
# What is a multi-disciplinary engineer?




Graphique : Centrale Nantes

A professional with **a strong scientific and technical background**, complemented by **skills in project management and innovation.**

**Three key aspects of the « generalist » profile**:

- Multidisciplinary training (mathematics, mechanics, energy, computer science, materials science, physics, etc.)
- Adaptability to technological advancements and new industrial challenges
- A systems approach (fundamental sciences & practical applications) to solve global problems

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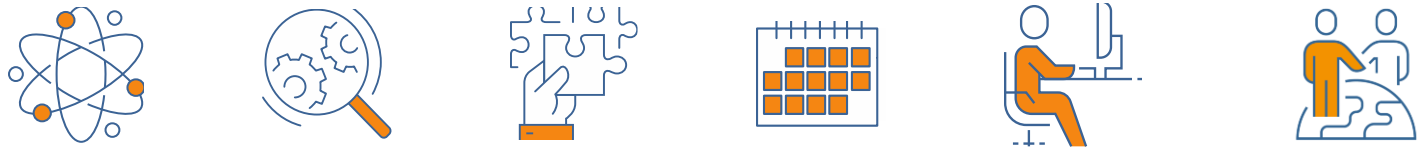
# In practical terms ...

**The multi-disciplinary engineering program is based on :**

- A rich core curriculum to build a solid foundation, building upon the undergraduate preparatory classes
- Specialization / advanced study tracks
- Courses grounded in practical application (labs, tutorials, projects, etc.)
- Significant emphasis on knowledge and practical experience in the business world (projects, conferences, job fairs, internships, etc.)
- Compulsory international experience





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Source : Centrale Lyon

# Proposed academic exchange schemes

- Internships
  - Master level for 6 months
- 1 Semester (S8)
- 1-year exchange program
  - Master level - Period of study : S9+S10
- 2-year exchange programs
  - DESIRED DEGREE : EC ENGINEER
    - Beginning at S5 (sept) level for 2 years (DD T.I.M.E.)
    - Beginning at S7 (sept) level for 1,5 years + Master Thesis with full respect of the conditions defined by ECL for an End of Study Internship (realized in France or Partner's country)
  - DESIRED DEGREE : EC MASTER
    - Beginning at S9 (sept) level for 1 year including a Master thesis in laboratory
    - Beginning at S8 (february) level for 1,5 years including a Master thesis in Laboratory

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# Student activities and clubs : Student Office (BdE), Arts Club (BdA), Sports Club (BdS), etc.

Professional experience in student-run organisations:

- *Ingénieurs sans Frontières (« Engineers without Borders »)*
- Junior Entreprise
- Company Forum



Sports and other clubs :

- Jazz, Chess, Theatre, Cinema, Dance
- Sailing, Rugby, Football, Basketball, Martial Arts, etc.

International Clubs

- Club TIME, etc.






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# Accommodation : private student residence at each school



## Priority for international students

- Individual or shared rooms
- Internet connectio
- TV
- Gym
- Laundry facilities
- Other facilities







Le séjour / The living room



Le cabinet de toilettes / Toilet corner



Le coin cuisine / The cooking corner

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# 02

# Double Degree program

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# Standard École Centrale curriculum and Double Degree tracks

| | | |
|---|---|---|
| 8th Year | PhD | Industry |
| 7th Year | | |
| 6th Year | | |
| 5th Year | Master's Level | Year 3 |
| 4th Year | | Year 2 |
| 3rd Year | | Year 1 |
| 2nd Year | Bachelor Level | Preparatory Classes (CPGE) |
| 1st Year | | |
| | *High School Diploma* | |
| University Level | Diplomas | GEC Curriculum |

***3-year Engineering Education***

*Mostly Maths, Physics & Chemistry*

*Most common double degree arrangements*

| | | | | |
|---|---|---|---|---|
| 8th Year | | | | |
| 7th Year | | | | |
| 6th Year | | Master's degree at home Institution | 2nd year of Master's degree at home uni. | Year 3 at GEC |
| 5th Year | Year 3 | | Year 3 at GEC | Year 2 at GEC |
| 4th Year | Year 2 | Year 2 at GEC | Year 2 at GEC | 1st year of Master's degree at home univ. |
| 3rd Year | Year 1 | Year 1 at GEC | Bachelors' degree or equivalent at home university | Bachelors' degree or equivalent at home university |
| 2nd Year | Preparatory Classes (CPGE) | 1st & 2nd Year of Bachelor's or equivalent at home university | | |
| 1st Year | | | | |
| | | | | |
| University Level | GEC Curriculum | Double Degree Curriculum 1 | Double Degree Curriculum 2 | Double Degree Curriculum 3 |

# 03

# Presentation of the Ecoles Centrale

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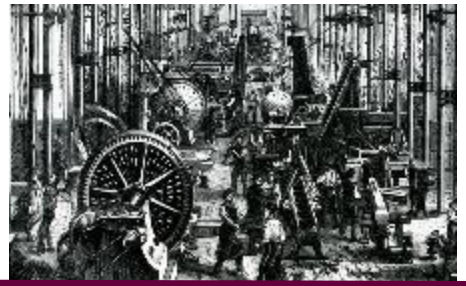
# Reinventing engineering for 200 years

**1829-1870**
**INDUSTRIAL REVOLUTION**



CENTRALE PARIS

**1829**

**1870-1970**
**ELECTRICAL REVOLUTION**



Supélec

**1894**

**1970-2020**
**DIGITAL REVOLUTION**



CentraleSupélec

**2015**

**2020 onwards**
**SOCIETAL REVOLUTION**



CentraleSupélec
université PARIS-SACLAY

**2020**

# Comprehensive, research-intensive, and world-renowned university

université PARIS-SACLAY

**13th**
Academic Ranking of World Universities



48,000 students

16,600 faculty and staff

18 graduate schools

275 laboratories

13,000 publications a year

# Who We Are Today

**5,200 students** from **70 nationalities**

**French Engineering School**

- *Undergraduate*
- *Graduate*
- *PhD*

**200+ partners** worldwide

## Paris-Saclay



## Paris



## Rennes



## Metz

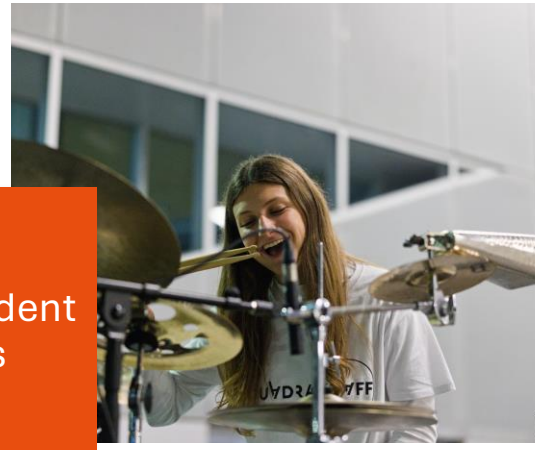


# Student life: the « Grande École » spirit

2,500 beds on campus



100+ student clubs



Mandatory sport course

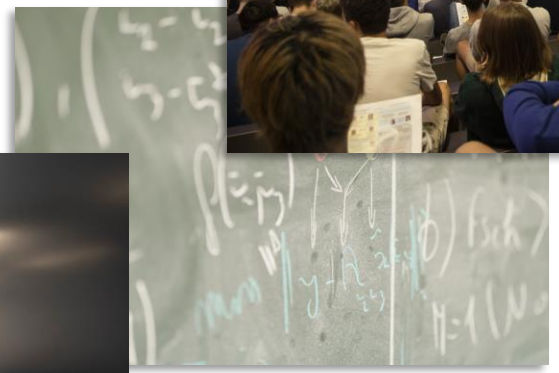


*Le Lumen*, innovative learning centre



# How We Deliver: A Curriculum Built for our Ambition







## Global Engineering

*(“Diplôme d’ingénieur”)*

40% common core / 60% electives

9 majors:

- Civil Engineering & Transportation
- Energy
- Industrial Engineering
- Computer Science
- Mathematics & Data Science
- Physics & Nanotechnology
- Operations Research & Control
- Communicating Systems & IoT
- Living – Health/Environment

Tailored tracks:

- Research
- Entrepreneurship
- Apprenticeship
- Dual degree
- Gap Year

Ecological and social responsibility:

- Sustainable DevelopmentCorporate Social Responsibility/Green Transition programme
- Civil commitment
- Languages

# Pathways for Every Ambition

## Specialised Engineering tracks

Cybersecurity (*Rennes*)

Computer Science (*Metz*)

Digital Systems

From Signal to AI to the processing and transmission of information (*Rennes*)

Electronics (1 semester in *Rennes*, 3 semesters in *Paris-Saclay*)

Energy

System sciences for sustainable energy (*Rennes*)

Physics

Quantitative systems, photonic, nanotechnologies (*Metz*)





# Centrale Lille Institut in a few numbers …

Centrale Lille is a public higher education and research institution.

**4** Engineering schools

**14** Master programs

**3** Doctoral schools

**2 200** students

**2** campuses — Villeneuve d'Ascq, Lens

**34 000 m²**

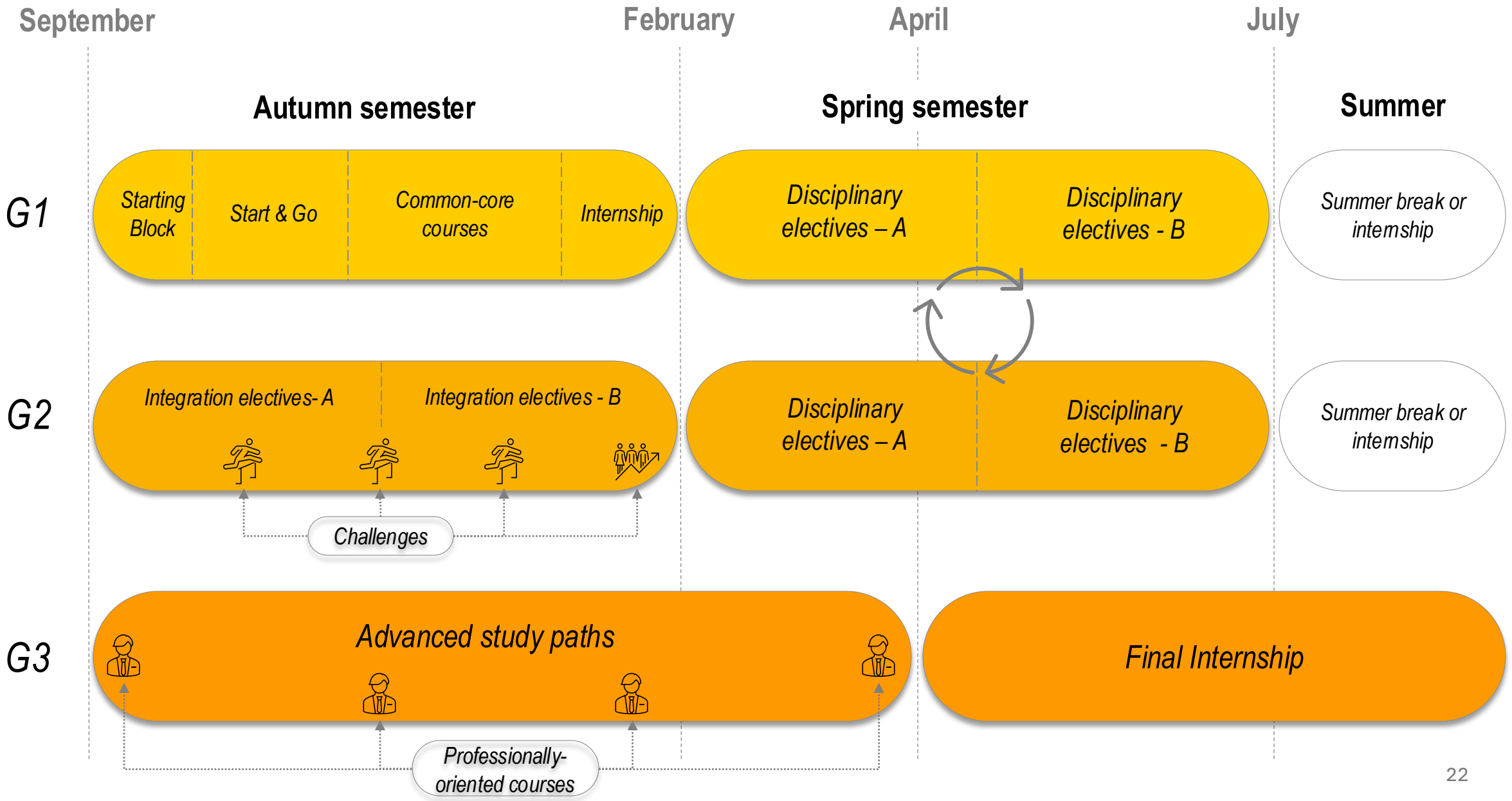
**154** administrative and technical staff

**262** teachers and teacher-researchers

**4** Research themes

**7** Research laboratories

# Multi-Disciplinary course- École Centrale de Lille



# Final Year Concentration Courses

## SMART SYSTEMS AND ENVIRONMENTS

Smart cities - Smart transports - Smart building - Smart energy - Smart industry - Smart health



Interactive Systems and Advanced Communications

Embedded Systems and Cyber-Physics



## INDUSTRY OF THE FUTURE

Design sustainable, environmentally friendly and agile products and production systems



Sustainable Design and Production

Industry 4.0



## ENGINEERING AND HEALTH

Engineering better care for patients



Artificial Intelligence and Digital Health

Health Care and Product Design



## FROM DATA STRATEGY TO DATA CONTROL

Take up the challenge of economic, organisational, digital and technological transformation



Data science and artificial intelligence

Enterprise architecture and modelling



## SUSTAINABLE CONSTRUCTION AND ENERGY

Smart cities in relation to climate change



Sustainable Materials and Construction

Energy, electric mobility & smart grids






## Graduates in employment

**90,1%**

of which **7,1%** entrepreneur

of which **7%** in PhD

of which **2,1%** in further study

## Average salary on hiring

**47 K€/year**

Gross salary

## Company size

- **30,6%** > 5 000 employees
- **24,1%** De 50 à 249 employees
- **23,1%** De 250 à 4 999 employees
- **22,2%** < 50 employees

## Time to 1st job

- **8,4%** between 2 and 4 months
- **4,7%** more than 4 months
- **14%** less than 2 months after graduation
- **72,9%** before graduation



## Main sectors of activity

- **38,9%** Consulting firms
- **19,4%** Computer and information services (ICT services)
- **7,4%** Finance / insurance
- **6,5%** Energy
- **5,6%** Automotive, aerospace, shipbuilding and rail industries



Response rate : 62,6%

## Nature of the employment contract



- **80,6%** Open-Ended contract
- **13,6%** Foreign contract
- **3,9%** Fixed-Term contract
- **1,9%** Other

## Company locations



- **62,2%** Île-de-France
- **17,1%** Others regions
- **13,5%** Foreign
- **7,2%** Hauts-de-France

## Main occupations

- Digital Transformation Analyst
- AI consultant
- Engineering Project Manager
- Digital Transformation Analyst
- Data scientist
- Project manager
- Software engineer
- Business analyst
- Decarbonization Engineer
- Energy project analyst
- Methods & Industrialization Engineer
- Works engineer
- Sustainable Construction Engineer
- R&D engineer

CENTRALE LYON

# International Exchanges



# Lyon and the Auvergne Rhône-Alpes region




**Auvergne Rhône-Alpes is the second largest economic region in France.**

Lyon en TGV est à :

- 2h de Paris
- 1h30 de la côte méditérrannéenne
- 1h30 des Alpes

The Rhône-Alpes region has more than 200 ski resorts!





Diverse and remarkable natural environments: 1st region in terms of the number of regional natural parks



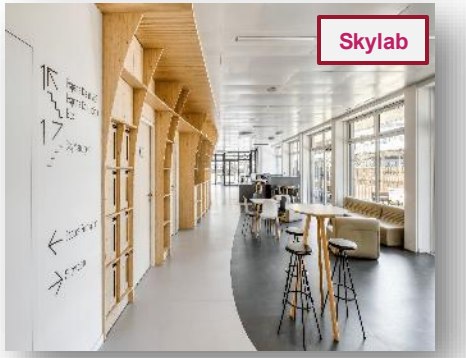





# Lyon – a historic town

**In 1998, Lyon became listed as a UNESCO World Heritage Site.**



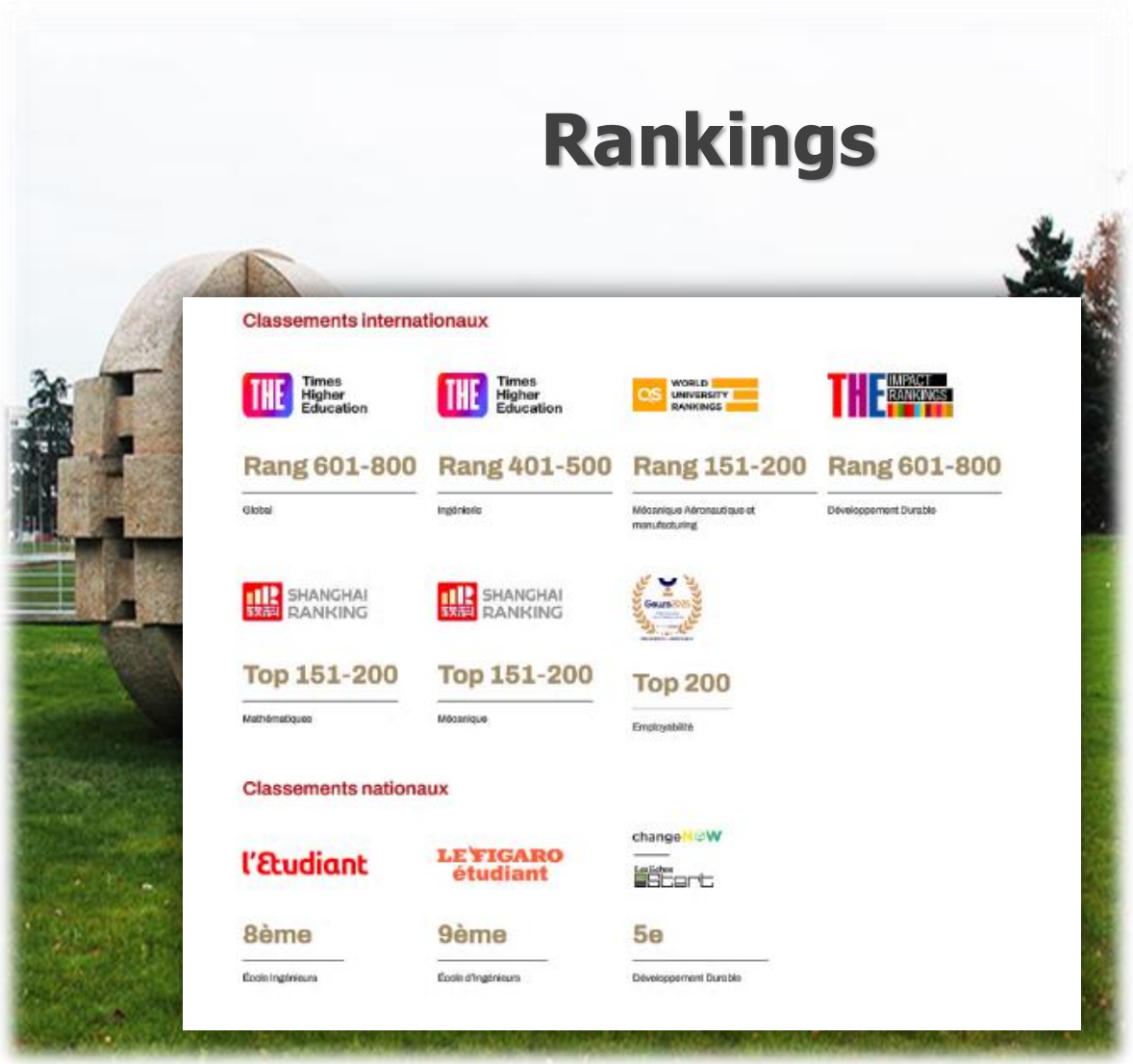








# Some statistics




- 17-hectare green campus
- 2 Campuses (Lyon-Écully and Saint-Étienne (ENISE))

- 1 General Engineering Degree
- 14 French Master's Programs
- 8 International Master's Programs

- 6 Research Laboratories: LTDS, LMFA, Ampère, INL, ICJ, LIRIS
- 2 International Laboratories
- 10 Joint Laboratories with Companies
- Approximately 140 Faculty Members

- More than 3,000 students enrolled in various programs
- 250 Master's students
- More than 300 doctoral students
- 24% International Students
- 24% Women
- More than 50 different nationalities represented on campus
- 12,000 Alumni Worldwide

# Multi-disciplinary engineering program

## Common-core courses– Semesters 5, 6 & 7

| Semester 5 | Semester 6 | Semester 7 |
|---|---|---|
| ➢ Electrical Energy and System Control<br>➢ Fluid Mechanics and Thermodynamics<br>➢ Mathematics<br>➢ Economics and Management Sciences | ➢ Mechanical Engineering<br>➢ Solid and Structural Mechanics<br>➢ Information Technology<br>➢ Computer Science | ➢ Materials Science<br>➢ Materials Physics<br>➢ Social Sciences |
| ➢ Information Technology<br>➢ Computer Science<br>➢ Mathematics<br>➢ Economics and Management | ➢ Materials Science<br>➢ Materials Physics<br>➢ Electrical Energy and System Control<br>➢ Fluid Mechanics and Thermodynamics | ➢ Mechanical Engineering<br>➢ Structural and Solid Engineering<br>➢ Social Sciences |
| L'UE Pro<br>Languages | L'UE Pro<br>Languages<br>Internship (3 weeks) | Specialization<br>(2 subjects from a choice of 8)<br>L'UE Pro<br>Languages |

**Each teaching module lasts 96 hours:**
- Conferences (24h)
- Classes (24h)
- Practical laboratory work (48h)

**L'UE Pro :**
- Study project
- Conferences
- Sport
- Company visits
- Job interviews

## Elective courses – Semesters 8, 9, 10

| S8 | IN-DEPTH PROFESSIONAL DEVELOPMENT (S9) | IN-DEPTH SECTORAL DEVELOP¨MENT (S9) | S10<br>Final Thesis project |
|---|---|---|---|
| 5 Elective Courses chosen from a list of 60<br><br>*Many courses are taught in English and shared with the first year of the International Masters program.* | ▪ Consulting Engineer<br>▪ Eco-design and Innovation Engineer<br>▪ Supply Chain and Business Performance Engineer<br>▪ Industrial and Environmental Risk Management Engineer<br>▪ Research, Innovation, and Development Engineer<br>▪ Intrapreneurial Engineer and Entrepreneur | ▪ Aeronautics<br>▪ Health Bioengineering<br>▪ Energy<br>▪ Physics<br>▪ Ecological Transition and Territories<br>▪ Computer Science<br>▪ Mathematics and Decision-Making<br>▪ Transport, Mobility, and Decarbonization | SNCF, RENAULT TRUCKS, sopra steria, ALSTOM, L'ORÉAL, TotalEnergies, THALES, ATELIERS DE FRANCE |
| (https://offre-formation.ec-lyon.fr/fr/node/39025297) | 9 courses to choose from among more than 50 topics (https://www.ec-lyon.fr/formation/ingenieur-generaliste ) | | https://www.ec-lyon.fr/entreprises/devenir-partenaire/les-entreprises-partenaires |

# International Opportunities with Centrale Méditerranée



## International Relations



# Spécialisation

## Formation

➢ 5 main subject areas in which the teaching

remains multidisciplinary but specialized around the chosen area :

- Biomedical engineering **Taught in english**
- Environmental engineering
- Information tech. & digital society
- Dynamics, transformation & crisis
- Renewable energies

## Recherche

1. Advanced Materials and Nanotechnologies
2. Mediterranean Archaeology
3. Mathematics and Computer Science
4. Cancer and Immunology
5. Creativity and Innovation
6. Imaging
7. Rare Diseases
8. Mechanics and Engineering
9. Mediterranean Environmental Transition
10. Microbiology, Bioenergies and Biotechnology
11. NeuroMarseille
12. Physics of the Universe
13. Fusion and Instrumentation Sciences in Nuclear Environments
14. Ocean Sciences
15. Societies in Transition in the Mediterranean

# MANY STUDENTS CLUBS

Business / Innovation / Citizenship/
Sport / Culture / Student life

Total : **24** associations

**iCM**: International Centrale Marseille
**Fablab** Marseille
**ISF** (Engineers Without Borders)
**FOCEEN**: jobfair
**Echanges Phocéens**: social responsibility
**KSI**: junior enterprise operated by students






















- 4 national parks.
- 9 protected areas.
- 9th most dangerous city in France
- 15th most expensive city in the country
- One of the oldest cities in Europe, founded approximately 2,600 years ago.
- 2nd largest city in France, with approximately 873,000 inhabitants.
- 58 public research institutions, making it the second largest city in France.
- 3 hours by train from Paris, Italy, Spain, and Switzerland.



# 22 Engineering Programme Specialisations

CENTRALE NANTES

## Automatic Control and Robotics

Energy Control & Management
Data Analysis & Application in Signal and Image Processing
Robotics

## Product Design and Industrial Systems

Industrial Engineering
Low tech Engineering – sustainable Housing Techniques
Innovative and sustainable products and processes

## Fluid Mechanics and Energetics

Aeronautics
Propulsion & Transport
Energy Production & Management
Ocean: Hydrodynamics & Marine Engineering
Renewable Energies and Grid Integration
Engineering Science for Housing & Urban Environment
International Small Wind Turbine Contest

## Mechanics, Materials & Civil Engineering

Civil Engineering and Sustainable Construction
Mechanical Engineering for Materials & Manufacturing
Advanced modelling and analysis of structures

## Mathematics, Computer Science and Biology

Computer Science for Information Systems
Computer Science for Artificial Intelligence
Computer Science for Virtual Reality and Augmeneted Reality
Digital Sciences for Life Sciences & Healthcare

**open for double degree mobility**



**Internships:**

Year 1 = 1 month
Year 2 = 5 months
Year 3 = 6 months

## 9 Master's Programmes

### MARINE TECHNOLOGY

- Hydrodynamics for Ocean Engineering
- Atlantic Master on Ship Operation & Naval Engineeri

### MECHANICAL ENGINEERING

- Advanced Manufacturing
- Energetics and Propulsion
- Advanced Composite Engineering and Science
- Advanced Composite Engineering and Science

### CONTROL AND ROBOTICS

- Data Science, Signal and Image Processing
- Advanced Robotics

### CITY ENGINEERING

- Materials and Structures in Their Environment

**open for exchange mobility**










- **2 hours** away from Paris by fast train
- **40 min** from the sea by train or car
- **International airport** (88 destinations, 25 countries)
- +100 parks and gardens
- Nantes, historically an **industrial** pool
- Proximity with large industrial groups Airbus, Naval Group, or STX Shipyard
- Elected 3rd best city for students in 2020

**6th largest city** in France
Home to **60 000** students

AIRBUS

SAFRAN

Renault Group

Hewlett Packard Enterprise

## Over 110 student clubs and associations on campus

- Latino dancing club
- Salsa
- Bachata
- Jazz
- Chess
- Theatre
- Cinema
- Rugby
- Football
- Basketball
- Martial arts
- Robotics
- Sailing
- Cooking, etc.



Excellent sports facilities: artificial pitch, squash courts, dojo,

## Welcome Support

- Accommodation near campus provided (250-550
- Airport / Train station Pick Up
- Help with administrative procedures such as Health insurance, Visa renewal…
- Welcome week

> 35% international students on campus

86 nationalities

# Thank you for your attention!

GROUPE DES ÉCOLES CENTRALE