

ÉCOLE CENTRALE DE LYON

L'ÉCOLE D'INGÉNIEURS ENTRE
HUMANITÉS ET INNOVATION



International Exchanges

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Lyon and the Auvergne Rhône-Alpes region



- Rhône-Alpes is the second most important region, economically, in France
- Lyon is:
 - 2 hours from Paris by TGV
 - 1½ hours from the Mediterranean coast
 - 1½ hours from the Alps
- The Rhône-Alpes region has over 200 ski resorts

« **Carte Avantage Jeune** »
Youth Advantage Card
For people between 12 and 27 years old. You can buy it for 49 euros on internet or at the train station. That gives you 30% discount on train tickets.

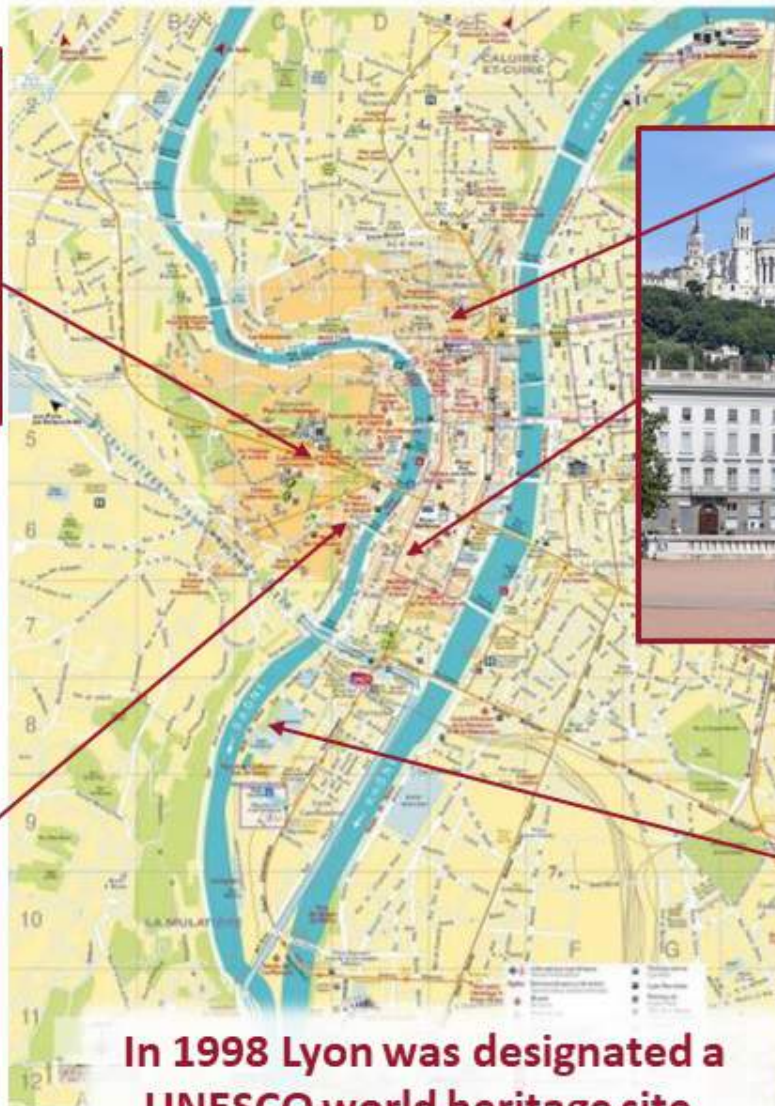
One way Lyon-Paris : average 45 euros with the "carte avantage jeune"

Lyon – a city of historical importance...

From Roman times...



... to Mediaeval...



In 1998 Lyon was designated a UNESCO world heritage site.



... the 18th and 19th centuries...

... the 21st century



Lyon – a city of culture



Opéra National de Lyon



Musée des Beaux Arts



Théâtre des Célestins

Auditorium

Musée des Tissus

Halle Tony Garnier



Musée des Confluences



Lyon – a city of events

Olympique Lyonnais



Gastronomic
capital of France



l'Etudiant

Best student cities in France
2019: 1st equal with Toulouse
2020: 2nd, after Toulouse

Banks of
the Rhône



Fête des Lumières 8th December



Lyon – a city of industrial innovation



Silk industry
Jacquard (1752-1834)



Berliet Industrial Vehicles - Renault V.I.

Rhône-Poulenc
⇒ Aventis



Cinematography
Lumière brothers



Merial

Condé Nast Traveler

Lyon, second best big city in the world ! 2020 Readers' Choice Awards

“Bring your appetite to Lyon, the gastronomic capital of France. With a more intimate atmosphere than the City of Lights, Lyon is a must for many travelers due to its stunning architecture and timeless beauty. Request a balcony room at *Villa Maia*, with interiors designed by Jacques Grange (responsible for the homes of Yves Saint Laurent and Karl Lagerfeld), for sweeping views of the red-roofed city. From there, take a culinary tour: a dim sum lunch service (yes!) at *La Bijouterie*, a progressive and feminine approach to the city’s traditional dishes at *Le Bouchon des Filles*, and on weekends browse the local flavors at the Saint Antoine outdoor market along the Saône.”

Ranking:

1. Kyoyo (Japan)
2. Lyon (France)
3. Singapore
4. Sidney (Australia)
5. Vienna (Austria)

<https://www.cntraveler.com/galleries/2014-10-20/top-25-cities-in-the-world-readers-choice-awards-2014>

ECL – A long tradition

Founded on internationalism, innovation, entrepreneurship and social responsibility

François Barthélemy Arlès-Dufour (1797-1872)

- Began life as a factory worker
- Travelled extensively in Germany (Leipzig, Munich...) and the UK
- Joined the Dufour silk company in Leipzig; returned to Lyon to manage the Dufour silk factory
- Created his own company, with branches in France, Switzerland, Germany, Italy, UK, USA.
- Co-founded: Banque de Lyon, Compagnie du chemin de fer de Paris à Lyon, Compagnie du chemin de fer de Lyon à Avignon, Compagnie Générale des Eaux, Crédit Industriel et Commerce, Crédit Lyonnais.....
- Co-founded the Société d'Etudes du Canal de Suez; worked with DE LESSEPS, Robert STEPHENSON and others to promote the construction of the Suez canal
- Supported Julie-Victoire DAUBIÉ – first woman in France to be awarded a Bachelor's degree
- 1857: co-founded the *Ecole Centrale Lyonnaise* with Désiré GIRARDON



Some statistics

- 1550 student engineers enrolled in various programmes
- 25% female students
- 235 Master students, 200 PhD students
- 400 permanent staff:
 - 120 Lecturers and professors
 - 50 full time researchers
- 24% international students
- Over 50 different nationalities on campus
- 12,000 alumni throughout the world



Rankings

		2020	2019	2018	2017	
National (Engineering science)	L'Étudiant	7 th	4 th	6 th	6 th	
	Le Figaro	7 th				
International (Mechanical & Aeronautical Engineering)	Shanghai	101-150	101-150	101-150	151-200	International
		7 th	6 th	6 th	11 th	France
	QS	101-150	101-150	201-250	201-250	International
		5 th	4 th	4 th	3 rd	France

L'Étudiant
LE FIGARO



ACADEMIC RANKING OF WORLD UNIVERSITIES
SINCE 2003

QS WORLD UNIVERSITY RANKINGS

International relations

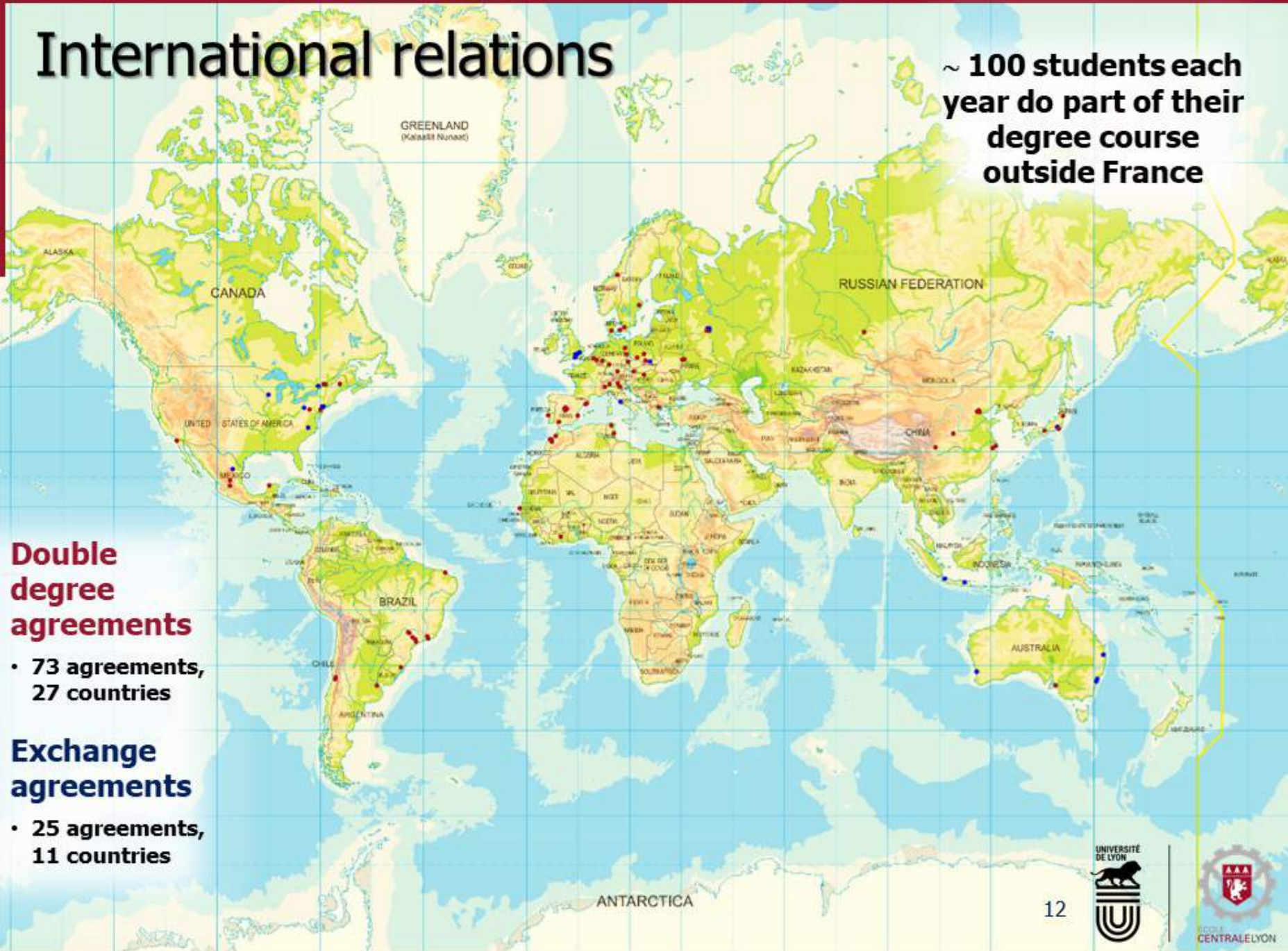
~ 100 students each
year do part of their
degree course
outside France

Double degree agreements

- 73 agreements,
27 countries

Exchange agreements

- 25 agreements,
11 countries



The French Academic System

UK (MD or 3-4-7)		Europe (LMD or 3-5-8)		Grandes Ecoles (Engineering schools)		Age
			D3		D3	26
	D3		D2		D2	
	D2	Doctorate	D1	Doctorate	D1	23
Doctorate	D1		M2	S9/S10	GE3	
Master	MEng	Master	M1	S7/S8	GE2	
	B3		L3	S5/S6	GE1	20
	B2		L2	Classes	CP2	
Bachelor	B1	Licence	L1	Préparatoires	CP1	18
Secondary school/High school						

The Curriculum – 1

The core curriculum – semesters 5, 6 & 7

Semester 5 <i>Beginning of September – end of January</i>		Semester 6 <i>Beginning of February – end of June</i>		Semester 7 <i>Beginning of September – end of January</i>	
Group A	Group B	Group A	Group B	Group A	Group B
Electrical and control engineering	Information technology	Mechanical engineering	Materials science	Materials science	Mechanical engineering
Fluid mechanics and thermodynamics	Computer science	Solid and structural mechanics	Physics of materials	Physics of materials	Solid and structural engineering
Mathematics	Mathematics	Information technology	Electrical and control engineering	Social sciences	Social sciences
Economics and management	Economics and management	Computer science	Fluid mechanics and thermodynamics	Specialization (2 subjects from a choice of 8)	
Engineering profession Languages		Engineering profession Languages Internship (3 weeks)		Engineering profession Languages	

Each teaching module lasts 96 hours:

- Lectures (24hrs)
- Examples classes (24hrs)
- Laboratory practical work (48hrs)

Engineering profession:

- Group project
- Invited lectures
- Sport
- Site visits
- Professional interviews

The Curriculum - 2

Semester 8

Beginning of February- end of May

Group A	Group B	Group C	Group D	Group E	Group F
Finite Element Method	Functional analysis	Mathematical biology	Webapps	Algorithms and reasoning	Order within chaos
GUI programming in C++	Collaborative algorithms and applications	Interactive design and Fablabpractices	Adaptive filtering – active noise control	Surfaces, friction, vibrations	Insulating materials for electrical engineering
Life, information and systems	Non-destructive testing	Image sensing and processing	PLM – Digital mockup	From microscale to macroscale in mechanics	Intelligent mecatronic systems
Numerical methods for mechanics	Nuclear engineering	Multiphysics simulation in mechanical design	Physics and chemistry of surfaces and interfaces	Selection of materials	Musical acoustics
Mechanical metamaterials	Health engineering	Observation and analysis of materials	Ecology and environment	Aircraft turbojets	Antenna, signals and processors
Mechanics of thin structures	Hydrology and water resources	Microwave circuitry	Introduction to random vibrations	Industrial process engineering	Humans and their waste
Rotor dynamics	Development of technological products	Fundamental soil mechanics	Two phase flow in energy systems	Globalization and transculturalities	Polymer materials, physical properties and innovation
Optics and photonics	Design of sustainable packaging	Philosophy of science and technology	Interpersonal communication and professional practices	Collaborate and manage in the era of digital technologies	Optimal design and computational fluid mechanics
Social, economic and political issues for sustainable development	Political sociology	Corporate finance	Wind turbines		Entrepreneurship and innovation
	Marketing		Space physics and solar-terrestrial coupling		Financial markets
			Machine learning		Probability theory and random processes
Engineering profession Languages Internship (8 weeks)					

Courses in **bold** are taught in English

The Curriculum - 3

Semester 9				Semester 10
September-December		January-March		April-September
Métier	MOD	Option	MOS	Internship, in a laboratory or a company. Evaluated on the basis of: <ul style="list-style-type: none"> • Report • Presentation. 50% of the final year mark
Consulting	Choice of 6 from 70. For each module: <ul style="list-style-type: none"> • 16 hours of lectures • 12 hours of laboratory work/design office Many courses in English	Aeronautics	Choice of 4 from 50. For each module: <ul style="list-style-type: none"> • 28 hours: <ul style="list-style-type: none"> • lectures • labs • design office Many courses in English	
R & D		Bio & Nano		
Logistics		Civil & Environ.		
Business developpt.		Computer science		
Eco-design		Energy		
Risk management		Maths & finance		
		Transportation		

Possibility of doing a Master's degree in parallel

Final year options

Transport and Traffic



Energy

Civil and Environmental



Aeronautical

7 Engineering disciplines



Bioengineering and nanotechnologies

Computer science and communication



Mathematics and Finance

Final year - métiers



Consulting Engineer



Research Engineer



Eco-design and
Innovation Engineer



Environmental and
Technological Risks
Management Engineer

6 Métiers



Business Development and
Entrepreneur Engineer



Organizational
Excellence Engineer

Masters degrees

French (M2 only)		International	
Materials Science	Lyon1, UJM, ENSMSE, IMT	Nanoscale engineering	Lyon 1, INSA
Electrical engineering	Lyon 1, UJM	Acoustics	Adelaide
Industrial engineering	EMSE, UJM, ENISE	Aeronautics	Darmstadt
Computer science	Lyon1, Lyon2, ENSL, UJM, ENSMSE		
Mechanics	Lyon1, ENISE, ENSMSE, IMT		
Optical engineering	UJM, ENSMSE, Institut d'Optique		
Environmental risk	Lyon 2, Lyon 3, ENTPE		
Ocean, Atmosphere, Climate	Lyon 1		
Sociology industrial relations	Lyon 2		
Economics	Lyon 1		
Health engineering	Lyon1, UJM, EMSE		
Public health	Lyon1		
Applied maths & statistics	Lyon1, ENSL, UJM, ENSMSE, IMT		
Civil engineering	Lyon1, ENTPE, ENISE		

Student projects

Sample subjects from 2020-2021

1 st year – Projet d'Etudes	2 nd year – Projet d'Application	
	Research	Industrial
Construction of a vertical axis dual wind turbine	Non-Newtonian fluids for synthetic teardrops	Carbonation without CO ₂ cartridges (SEB)
Discretizing the conservation equations using machine learning	Optimization of piezoelectric cells for active control and energy harvesting	Practical guide for monitoring atmospheric emissions (Suez)
Internet-enabled objects for a 'smart' campus	Hybrid Perovskite nanostructures for photovoltaic cells	Stress tests for climate effects on investment portfolios (Adamantia)
Dew harvesting using bio-inspired textured surfaces	False correlations in non-stationary series analysed with neural networks	Improving the competitiveness of rail freight (Ermewa)
Eco-responsibility and sustainable development for student residences	Numerical simulation of solitons using Smoothed Particle Hydrodynamics	Test rig for an eBike (Valéo)
Generating electricity from plants	Hyaluronic acid compounds for the treatment of arthritis of the knee	Miniaturisation of a diagnostic sensor for health monitoring (ADNucleis)
Modelling forest fires	Influence of novel sole technologies on the performance of running shoes	Ignition locks for HGVs (STEF)
Ageing of surgical masks	High performance computing for granular flow simulations	Position-finding inside buildings (Paris Fire Brigade)
Acoustics of concert halls	Novel low-tech carbon electrodes	Personal air-conditioner (SEB)

Admission to the Ecole Centrale de Lyon

- **Concours**
 - About 400 students/year
 - Top 2.5%-3% of those taking the national entrance exam
- **Casting**
 - For students who have a *Licence* or Bachelor degree
 - Open to international students
- **International exchange agreements**
 - Approximately 100 students/year
- **Master's degree (M2 only)**



International exchange programmes

- All ECL students must do a minimum of 1 semester abroad
- Exchange agreements with ~140 higher educational establishments
- No tuition fees for students in exchange programmes
- Room guaranteed in student residence on campus
 - Double degree 1+2
 - Double degree 2+3
 - 3rd year (S9 & S10) – DESECL (+ M2 Master's degree?)
 - Certificate in Research Training (1 or 2 semesters)
 - S8



Double degree programme

- Minimum of 4 semesters at the ECL
- All activities, including internships
- Additional courses in French language
- DD1+2:
 - Semesters S5, S6, S7 & S8 plus internships
 - Most teaching in S5, S6 & S7 in French
- DD2+3
 - Semesters [S5 or S7], [S6 or S8], S9 & S10 including internships
 - Some courses in S8 and S9 in English
 - Possibility of staggered entry: S8, S9, S10 then [S5 or S7]

Diplôme d'Études Supérieures de l'ECL (DESECL)

- Diplôme d'Établissement
- September-September, 60 ECTS
- Complete final year of engineering degree programme
- Includes internship
- Can be combined with an M2 Master's programme (*see slide 19*)
 - BUT unless the Master's option is included in the institutional exchange agreement, there is a registration fee for the Master
- Room on campus guaranteed
- Need to apply for an Option and a Métier
 - The choice of Option and Métier are not guaranteed

Certificate in Research Training

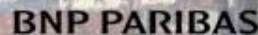
- Diplôme d'Établissement
- Principally a research project in one of our laboratories
- 1 semester or 2 semesters (30 or 60 ECTS)
- Can start at any time – no fixed calendar
- Eligible for Erasmus+ funding
- Can be in English
- Can follow any taught courses, as an auditor or for credits
- French language lessons
- Evaluated on the basis of a report and a presentation
- Jury includes a representative from the home establishment
- For some long projects with industrial partners, part of the research can be done as an internship

Semester 8

- February-July of each year
- 30 ECTS:
 - 6 courses chosen from those offered in Semester 8 (*see slide 15*)
 - Individual research project May-July
- Possible to choose only courses taught in English
 - But more limited choice
- No guarantee of a room in one of the residences – *but usually possible*

Internships

- An internship performed with a *convention de stage* from an educational establishment does not require a work permit
- Internships that last more than 2 months must be salaried
- *Minimum internship salary is 1/3 minimum wage*
- *For a student to be eligible for a convention de stage they must have completed 100 hours of full-time education in that academic year.*

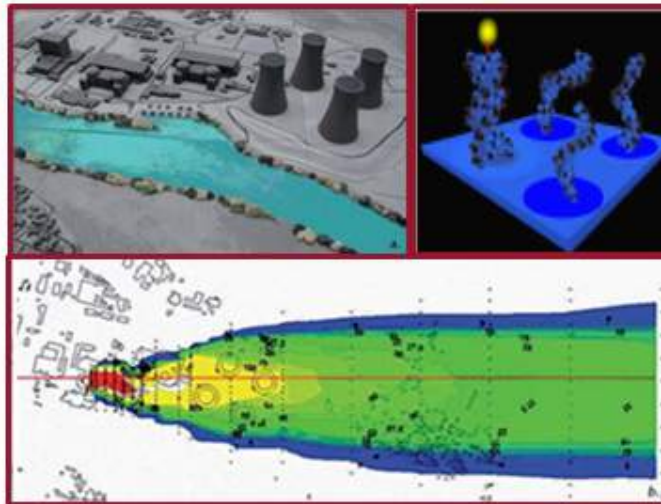


Research

A long tradition at the Ecole Centrale de Lyon

Major research priorities:

- Transportation (ground and aerospace)
- Nanotechnologies, nanomaterials
- Bioengineering
- Energy
- Environment (pollution, noise, natural and technological hazards)



Research – our laboratories

6 Research laboratories:

- LMFA – Fluid Mechanics and Acoustics
- LTDS – Tribology and System Dynamics
- INL – Lyon Institute for Nanotechnology
- Ampere – Electrical Engineering
- ICJ – Camille Jordan Institute for Mathematics
- LIRIS – Computer Science and Image Analysis

All are CNRS laboratories (National Scientific Research Council).
All are joint laboratories with other higher education establishments in Lyon and St. Etienne



LTDS

inl



LIRIS

LMFA

Ampere

Major research facilities



Anechoic chamber
Atmospheric wind tunnel
Phare
Tunnel ventilation simulation
Soliton simulator
Lightning simulator
ITVS
LTDS
INL

INL Laboratory – White Room

Research – International partnerships

6 joint International Laboratories:

- LIA Korea (Photonics)
- LIA Elyt – Tohoku (Tribology)
- LIA LN2 – Sherbrooke (Nanotechnology)
- LIA Beijing (Mechanics)
- LIA Sao Paulo (Electrotech)
- LIA ALPhA (Nanophotonics)

LIA:
*Laboratoire
International Associé*



Student life – the campus

Sports hall

Student residences

Cafeteria

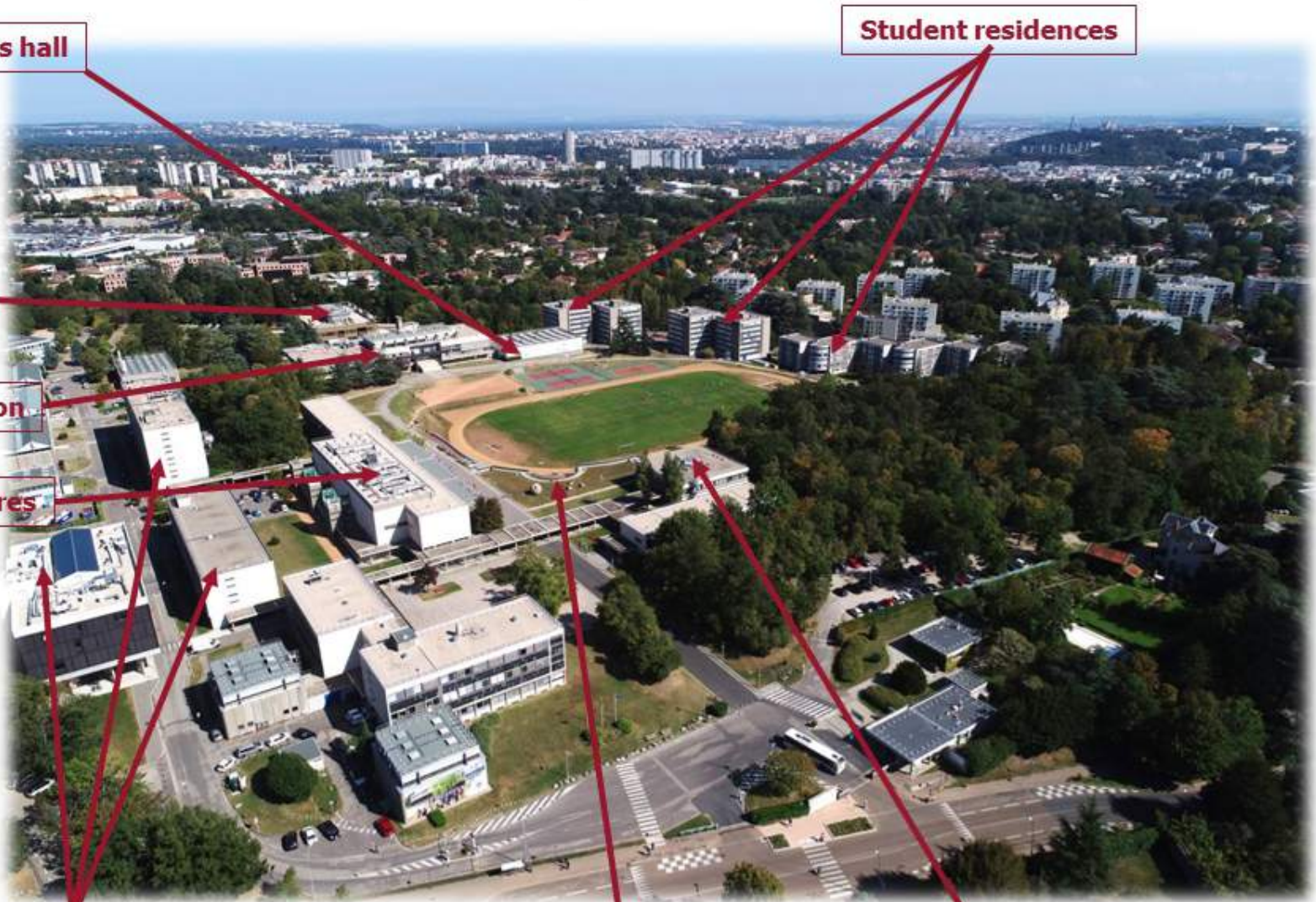
Students' union

Lecture theatres

Research laboratories

Computing centre

Library



Student life – accommodation & budget

- International students staying for a year or more are guaranteed a room on campus
- Monthly rent is between 300€ and 460€
- Tenancy for the whole year if necessary
- There are job opportunities on campus
- High-speed internet in every room
- On-campus cafeteria - The student menu at 3,30 € (rate 2020-21)
- Self-catering facilities



Student room of the Residence Paul Comparat



Common kitchen of the Residence Paul Comparat

Student life – campus facilities

On-campus facilities include:

- Student health centre
- Library, with subscriptions to many international periodicals
- FabLab
- Gymnasium
- Students' union
- Cinema

Student life – sport

- Sports field for football, rugby and athletics
- Sports hall with climbing wall
- 4 outdoor tennis courts
- Many different sports
- Teams for all levels of skill
- *Challenge* – annual sports tournament for *Grandes Ecoles*



Cooking School Paul Bocuse

Lyon's gastronomy has an international reputation thanks to its world-renowned chef, Paul Bocuse !

In partnership with the CROUS, on the second floor of the refectory, in a space of 120m², the campus of the École Centrale de Lyon welcomes the Paul Bocuse cooking school from September 2021.

In parallel to the training of apprentice cooks, this new partnership will allow engineering students to discover french and Lyon gastronomy, participate in cooking classes, culinary workshops, and many other events !



Student life - associations

Over 60 student clubs covering a wide range of activities:

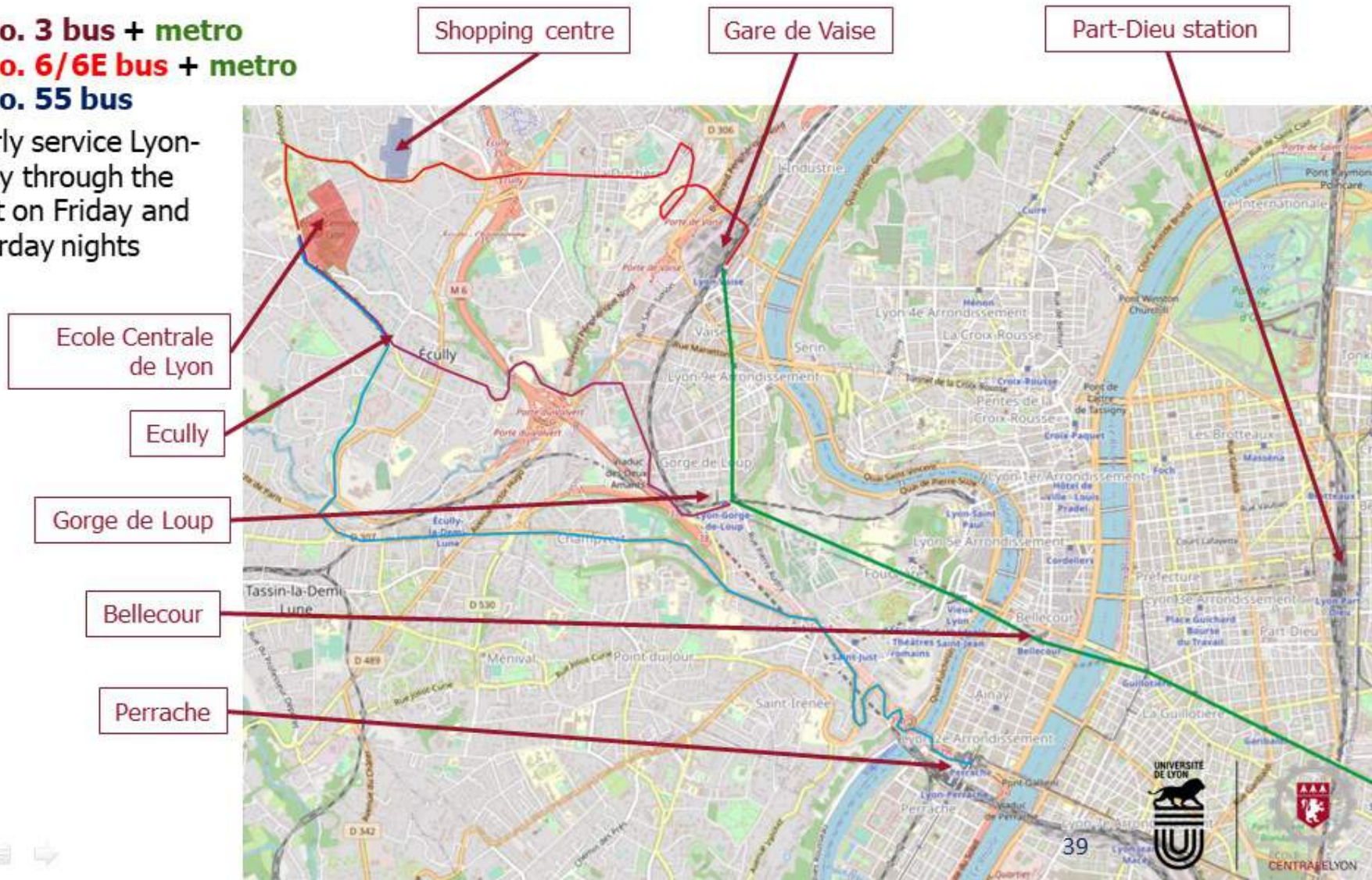
- Music, Theatre, Cinema, Photography...
- Centrale TV, Student newspaper...
- Student motorsports, rocket....
- Skiing, sailing, climbing....
- Ecology, Environment, International development...
- Model United Nations, International society...



Student life – transport links

3 Public transport links to the centre of Lyon:

- **No. 3 bus + metro**
- **No. 6/6E bus + metro**
- **No. 55 bus**
- Hourly service Lyon-Ecully through the night on Friday and Saturday nights



Getting started

Orientation week for International Students

- Help with administrative formalities (residence permits, health insurance, student cards....)
- Dedicated presentation of the administrative procedures at the Ecole Centrale de Lyon
- Short course specifically on *Scientific French*
- Integration activities organised by the *Bureau International*



Why not Centrale Lyon ?



CENTRALE LYON

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