



DOUBLE DEGREE

between the LM in Design and Engineering
and the French Ecoles Centrales

Selection at the 1st y LM

Departure at the 2nd sem 2nd y LM

To study in France

M1 (S8) + M2 (S9 –S10) all year
in the Masters of Engineering



DOUBLE DEGREE

between the LM in Design and Engineering
and the French Ecoles Centrales

At the end of the 90+90 credits

the students get:

the Laurea Magistrale in D&E at Politecnico di Milano

+

**a Master 2 degree of an engineering specialization of one
of the Ecoles Centrales**

(Paris, Nantes, Lille, Marseille, Lyon)

DD with the ECOLES CENTRALES in France

LES «GRANDES ECOLES»



ECOLES CENTRALES – a NETWORK numbers

Mutual educational programs

Well-developed relationships with **corporate** world
Shared international experience in student exchanges

2 000 graduate students in engineering/year.

450 Master's Degree students

280 PhD students

27 CNRS laboratories

27 000 engineers world-wide

ÉCOLES CENTRALES – Profiles «Centralien»

Écoles Centrales: **Top 10 « Grandes Ecoles »** (3 students out of 10 000)

General engineering profile

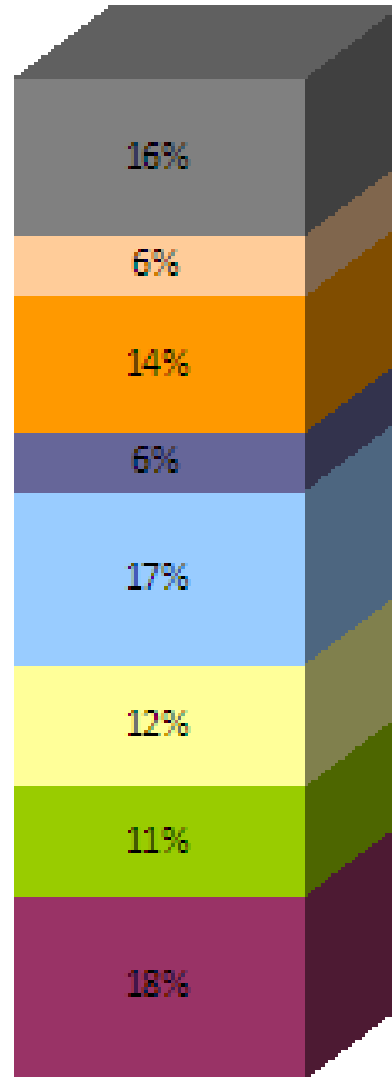
based on strong background in mathematics, physics and chemistry involving different scientific and technical disciplines, economics, management and humanities.

- Managing complex multi-disciplinary projects in all fields
- Global vision & open-minded approach
- Closely linked to **the corporate** and research worlds.

ECOLES CENTRALES – Profiles and network

All sectors of economy (public & private industry & services)

Research, development and innovation



Other sectors

Finance / Banking / Insurance

Energetics

Pharmaceutical / Food Industry

Design / Audit / Consulting

Public Works / Construction

Information Technology

Transport Industry

ECOLES CENTRALES - Methods

1. Small groups teaching and team-working: tutorials, practical works, project-work (supported by research labs).
2. Specific educational programs geared towards the corporate world: Companies participate in all levels of the engineering training program:
 - Trans-disciplinary projects on company proposals
 - **3 internships** in the curriculum
3. International experience (~4 months)

ECOLES CENTRALES - partners

- **Aerospace:** AIRBUS, CNES, DASSAULT AVIATION, DASSAULT SYSTEMS, EADS, SNECMA-SAFRAN
- **Energy:** ALSTOM, CEA, EDF, SCHLUMBERGER, TOTAL, AIR LIQUIDE, Général Electric, GDF Suez
- **Transport:** CGG CHANTIERS DE L'ATLANTIQUE, MICHELIN, PSA, RENAULT, SNCF, Eurocopter
- **Information Systems:** THALES, THOMSON MULTIMEDIA, ST MICROELECTRONICS, ORANGE, SOPRA Group, Accenture, France Telecom
- **Services:** L'Oréal , Ernst & Young, SAP Business Objects, Société, Générale, CIC, Mackinsey & company, AXA
- **Heavy and Light Metal Industry:** Arcelor Mittal, ALCAN, Vallourec

ECOLES CENTRALES - Skills and Values

- Capability of managing complex multi-disciplinary projects in all fields.
- Adaptability to a changing world throughout professional life.
- Innovation capabilities (entrepreneurial spirit)

- Democratic team spirit, sense of service, of responsibilities
- Awareness of sustainable development issues
- Being open, inquisitive, attentive

International experience/exchanges is a key point

ECOLES CENTRALES – Campus life

A strong associative life in each campus + Student Office (BdE) + Sport clubs

Professional experience:

student-run organisations (humanitary, social events, engineering prestations):

- Ingénieurs sans Frontières
« Engineers without Borders »
- Junior Entreprises
- Corporate Forums, Job Networking Sessions

Sports and clubs

- Jazz, Chess, Theatre, Cinema, Dance
- Sailing, Rugby, Football, Basketball,
- Club T.I.M.E., etc.



ECOLES CENTRALES - Campuses

Accommodation: student residences



Priority for international students

- Individual or shared rooms
- Wifi
- TV
- Gym
- Laundry facilities
- Other facilities



Le séjour / The living room



Le cabinet de toilettes / Toilet corner



Le coin cuisine / The cooking corner

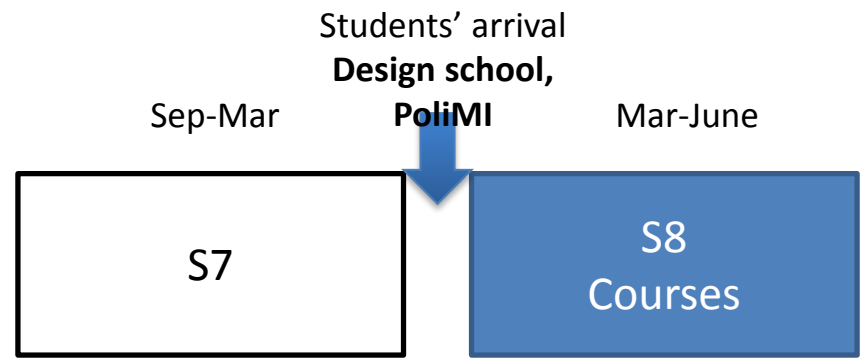


DESIGN ENGINEERING EXCHANGE

- *COLLABORATION POLITECNICO DI MILANO
AND CENTRALE SUPÉLEC*
- *S8 + M2 COMPLEX SYSTEM ENGINEERING,
DESIGN ENGINEERING, CENTRALE SUPÉLEC,
UNIVERSITY OF PARIS SACLAY*

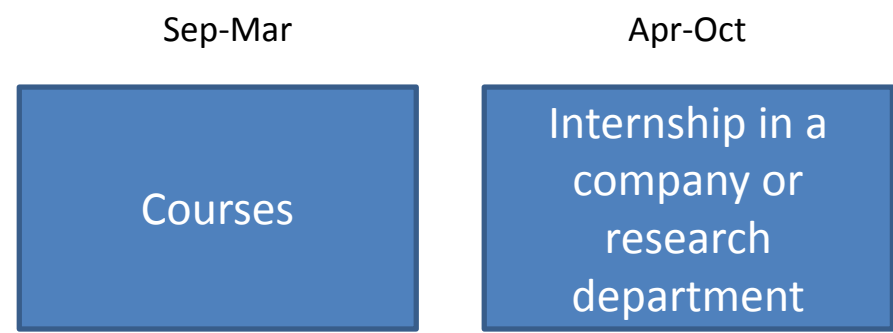
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M1 Complex System Engineering M.Sc.
Semester S8
Bac +4 or 5 / 4th year
2nd year
CentraleSupélec



Requirements to pass to M2:
Grade ≥ 12
(B+)

M2 Complex System Engineering M.Sc., Design Engineering (spe)
Bac +5 or 6/ 5th year
Final year
CentraleSupélec



Contacts
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Program Director M.Sc. Complex System Engineering:
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DD with : Centrale Supélec - Paris

Program S8/M1 Complex System Engineering

Semester S8 4 th year, M1 level	E8 End of Jan-March Final exam: March	E9 End of Jan-March Final exam: March	E10 Feb-June Final exam: June	E11 March-June Final exam: June	E12 March-June Final exam: June	E12 May14-18 Final exam: May 18
	Foreign Language (2ECTS)					
	Research Project					
	1 course (elective courses)	Mandatory course	Mandatory course		1 course (elective courses)	1 course (elective courses)
	IS1310: Graph Theory	SE2700: Decision making	SE2150: Systems Engineering		PR2100 Water treatment	EN2910 Aircraft design
			1 course (elective courses)	1 course (elective courses)		
	SE2750: Stochastic modelling: Queuing theory		MA2810 Introduction to Random Modelling	MA2827 Advanced discrete optimization	IS1350 Logic in mathematics for computer sciences	MG2920 ME-Sustainable construction and architecture
			Introduction to company creation	SE2650 Risk management	PH2810 Stati Physics for socio-economics	MG Development of future car seats

- Courses that are in bleu are taught in English

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M2 Complex System Engineering M.Sc.

Mandatory courses
Introduction to modelling and optimisation
Research design and protocols
English (scientific writing and communication)
New product development
Introduction to design engineering
Complex system design
Elective courses (4 courses from the list)
Decision making
Game theory: theory and applications
Creativity management and design
Enterprise management
Project management (advanced course)
Product Life-cycle Management
Sustainable development
Industrial ecology

Sep-March
30 ECTS

Internship:

- Company (R&D, Product development and design, Market search and intelligence, Purchasing, Business intelligence, etc.)
- Academia (research departments)

At least 4 months

Apr-October
30 ECTS

THREE SEMESTERS (M1 + M2)

S8: February – July

S9: September-March

Semester 10:

End of studies work and Master thesis

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S8: February - July

❑ 5 elective modules (out of 50) in various engineering fields:

- Electrical energy and Systems Control
- Computer Science
- Mathematics
- Economics and management
- Fluids and Energy
- Materials Engineering
- Physics and Chemistry of Matter
- Information Science and Engineering
- Mechanical Engineering
- Solids Mechanics and Structures
- Human and social sciences

❑ Language and culture

Students attend French courses and/or English courses

❑ Research project (6 months) in a lab of Ecole Centrale Lyon

6 CNRS laboratories (national scientific research center) with international impact and reputation.

- Fluid Mechanics and Acoustics (LMFA)
- **Tribology and Systems Dynamics (LTDS)**
- **Lyon Nanotechnology Institute (INL)**
- Ampère Laboratory (Electrical Engineering)
- Camille Jordan Institute (ICJ : Mathematics)
- Lyon Research Center for Images and Intelligent Information Systems (LIRIS)

❑ Engineering profession

- Sports
- Public taks on engineering fields

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S9: September-March

- ❑ **Registration in 3rd year of ECL and one of the following masters (several Master courses can be replaced by ECL courses or activities):**
 - **Chimie et sciences des matériaux**, Matériaux innovants pour la santé, le transport et l'énergie (<http://master-materiaux.univ-lyon1.fr/>)
 - **Nanosciences et nanotechnologies** (<http://www.ec-lyon.fr/formation/master/master-nanoscale-engineering>)
 - **Risques et Environnement**, Gouvernance des Risques Environnementaux (RISE), (<http://risques-environnement.universite-lyon.fr/?lang=fr>)
- ❑ **The engineering professions : 1 out of 8 (depending on the Master's Degree)**
 - IBDE - Business Development Engineer
 - ICS - Consultant Engineer
 - ICO - Eco-Design and Innovation Engineer
 - IGO - Industrial Operations Management Engineer
 - IMR - Industrial and Environmental Risk Management Engineer
 - IRD - Innovation, Research and development Engineer
 - ISC - Supply Chain Engineer
 - IE - Entrepreneur Engineer

- ❑ **Engineering fields of applications (1 out of 7- depending on the Master)**
 - AE - Aeronautics
 - BIN - Bio-Engineering and Nanotechnologies
 - EN - Energy
 - GCE - Civil Engineering and Environment
 - INFO - Computer
 - MD - Mathematics and Decision
 - TT - Transportation and Traffic
- ❑ **General engineering modules (6 out of 50- depending on the Master)**

During the last 2 semesters, the students follow a master affiliated to centrale Lyon : some master courses are common or can be replaced by a course of ECL (this has to be decided at the beginning of the master)

<https://campus.ec-lyon.fr/programmes-et-calendriers-4452.kjsp?RF=1460627744637>

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Semester 10: End of studies work and Master thesis

The End of Studies Work ends the engineering training with an internship of 5 to 6 months in a company or a laboratory. The student carries out a high-level scientific, technical and methodological work: the subject is chosen in agreement with the master of Design engineering. The work ends with the writing of a dissertation and an oral defense in front of a jury.

Materials, Processes and Technology of Composites (M-ENG MPTC)

- Innovative and optimized solutions in the design and manufacturing of composite materials for research and in industry.

The performance of fibre-reinforced organic-matrix composites and structures is influenced by the constituting materials and the processing stage.

Composite mechanical design can be efficiently and optimally performed when one has a good understanding of manufacturing influences and constraints.

The courses will provide the students with a theoretical and experimental emphasis on the relationships between constituents, processing and structural design.

1/2 M1 + full M2.

Language of instruction: English.

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30 ECTS Credits per semester.

Materials M1

Spring Semester	ECTS
Engineering Materials	5
Constitutive Laws	5
Structural Mechanics	5
Computer-aided Design	5
Mechanical Design	4
Conferences and Initiation to Research	2
Modern Languages	4

DD with : Centrale Nantes

30 ECTS Credits per semester.

Materials M2

Autumn Semester	ECTS
Composites and Constituents	2
Composite Characterization	4
Composite Processing Modelling	6
Composite Processing Technologies	3
Composite Structures	5
Numerical Design of Products	4
Optimization in Mechanics	4
Conferences	2

Spring Semester	ECTS
Master thesis / internship	30

Internships in industry

- Product design of a composite motorcyclist protection
- Sol-gel functionalization by nano-particle entrapping: a formulation for transparency
- Edge sealing and release agent optimization for aeronautic composite processes

Internships in research labs

- Composite design with multi-objective optimization
- In-situ compression of carbon-fibre reinforcements in X-Ray tomography
- Modelling and characterization of thin film piezoelectric materials

Skills

- Simulate and optimize composite mechanical design and manufacturing using numerical tools
- Model materials' behavior and physics involved in composite processes
- Characterize and manufacture composite materials
- Identify models, perform simulation and analyze results
- Communicate comprehensive results in a meaningful way
- Undertake bibliographic surveys of international research and professional literature
- Manage or be part of a project

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Advanced Manufacturing (M-ENG AM)

Skills for innovative and optimized solutions in the advanced design and manufacturing of products and structures for both research and industry.

Mechanical design of innovative mechanisms and products and customer-oriented design of products. Technical, human and economic factors

2 academic years - M1 2 M2. Advanced Manufacturing is one of four specializations available within the Mechanical Engineering stream.

English over the 2 years.

DD with : Centrale Nantes

30 ECTS Credits per semester.
English

Advanced Manufacturing M1

Spring Semester Courses	ECTS
Engineering Materials	5
Constitutive Laws	5
Structural Mechanics	5
Computer-aided Design	5
Mechanical Design	4
Conferences and Initiation to Research	2
Modern Languages	4

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30 ECTS
per
semester
English

Advanced Manufacturing M2

Autumn Semester	ECTS	Spring Semester	ECTS
Composites and Constituents	2	Master thesis / internship	30
Design Methodology	3		
Virtual Reality in Product Development	3		
Decision Support for the Design Process	4		
Composite Processing Technologies	3		
Composite Structures	5		
Numerical Design of Products	4		
Optimization in Mechanics	4		
Conferences	2		

Internships in industry

Mechatronic design for automotive front seats

Design optimization for noise reduction of rear axle's bushings

Modelling and simulation of an electro-hydraulic actuator

Internships in research labs

Magnetic pulse spot welding between aluminum and steel sheets. CAD design and prototyping of a reconfigurable 3-PRS parallel mechanism. Wire additive manufacturing: development of a depositing head

Skills

- Develop innovative processes and products for composite and metallic materials and structures
- Design products adapted to the processes
- Work in an integrated numerical environment and in a design & manufacturing global chain
- Identify models, perform simulation and analyze results
- Communicate comprehensive results in a meaningful way
- Undertake bibliographic surveys of international research and professional literature
- Manage or be part of a project

DD with the ECOLES CENTRALES - contacts

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The Promoters of the Double Degrees

ECOLES CENTRALES prof Barbara Del Curto

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