A quick glimpse...

- http://www.youtube.com/watch?v=-gp6SgubONg
- http://www.youtube.com/watch?v=_9a38pafR-U
- http://www.youtube.com/watch?v=bpvkLG66VXs
Known as l’X
What are the Grandes Ecoles?

- The *grandes écoles* (literally in French "higher schools") of France are higher education establishments outside the main framework of the French university system. The *grandes écoles* select students for admission based chiefly on national ranking in competitive written and oral exams. In contrast, French public universities have a legal obligation to accept all candidates of the region who hold a *baccalauréat*.

- Usually candidates for the national exams have completed two years of dedicated preparatory classes, although this is not always the case.

- They have produced many if not most of France's high-ranking civil servants, politicians and executives, as well as many scientists, writers and philosophers.

- Some *grandes écoles* concentrate on a subject area, such as engineering, sciences, social sciences, or business.
Facts & figures

Education

- 2,750 students
  - « Ingénieur Polytechnicien »: 2,000 students 20 % international
  - Master of Science: 250 students 50 % international
  - PhD: 500 students 35 % international

- 660 faculty members
  - 14 members of the French Academy of Sciences
  - 19 % international
  - 10 departments (education and research)

Research

- 1,600 people in the research center
- 600 researchers - 500 PhD
- 22 laboratories
- Total research budget of €95 million
- 1,000 publications per year

International

- More than 700 international students (27%) from 60 different countries
- 84% of a Class goes abroad (9 months)
- 445 visiting scientists each year (>1 month)
- 179 agreements with foreign universities
A multidisciplinary research centre

Physics and Applied Physics
(Theoretical, Condensed Matter, Solid-State, Particle, Nuclear, Plasma, Materials, Electronics, Lasers, Optics)

Mathematics

Applied Mathematics

Computer Science

Engineering Mechanics
(Solid Mechanics, Fluid Dynamics, Meteorology)

Biology

Chemistry

22 laboratories
1,600 people

Quantitative Economics & Finance, Management
Faculty

FACULTY - KEY FIGURES

1,100 teachers and professors

39% international faculty

99% of students employed 6 months after graduation

Academic paths:
- Scientific bachelor or equivalent degree (3 or 4 years)
- École Polytechnique Bachelor (3 years)
- French preparatory classes (2 years)
- Ingénieur Polytechnicien program (3 years)
- École Polytechnique Graduate degree (2 years)
- Université Paris-Saclay Master's degree (2 years)
- Université Paris-Saclay PhD (3 years)
- PhD program (5 years)
- École Polytechnique degree (1 year)

Professional world
Ecole Polytechnique Scholars Program

• 3.3 GPA required
• Must be able to read, write and comprehend French at least at a high intermediate level.
• 14-week term (early Sept. to mid December)
• Students take classes ONLY from Year 3 (courses numbered in the 500 range)
• Students take 4 classes in their Programme d’ Approfondissement (option) + possible Hum/SS class + required French class
Ingénieur Polytechnicien Program

- Both general and specialized studies

École Polytechnique's Ingénieur Polytechnicien Program is a unique 4-year program: 3 years to obtain the Engineering degree and 1 year to obtain École Polytechnique’s Diploma.
4 Year Program

- This 4-year curriculum provides students with:
  - A multidisciplinary scientific training that gives students a broad scientific base (basic sciences, engineering sciences, social economics).
  - A human, military and sports training that allows students to develop their behavioral and relational skills.
  - Specialized courses with advanced scientific concentrations that rival the top engineering schools worldwide.
Education

Undergraduate

<table>
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<tr>
<th>Year 1</th>
<th>Year 2</th>
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Graduate

« INGENIEUR POLYTECHNICIEN »

MASTER

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<tr>
<th>Year 3</th>
<th>Year 4</th>
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PhD

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<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
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</table>

Two to three years of undergraduate studies

> « Ingénieur Polytechnicien » 2,000 students 20% international
> Master Program 250 students 50% international
> PhD Program 500 students 35% international
Overview of Ingenieur Program

• 3rd year Curriculum Only
• https://programmes.polytechnique.edu/en/exchange-programs/international-academic-exchange-program/program-details
Application Process

Students must turn in all Caltech application forms by **DUE JANUARY 25**
Nominated candidates will turn do the Ecole Polytechnique application once nominated

**Caltech Application Requirements**
- Application Form
- Core Course Checklist
- 2-3 Recommendation letters
- Proposal
  - Personal Statement
  - Courses needed to graduate
  - Program Fit
  - Proposed Course List

**Ecole Polytechnique Requirements**
- Application Form
- Learning Agreement Form
- Curriculum Vitae
- An abstract of courses
- Language Evaluation
- A letter of statement in French
- Language Evaluation

Online Application Forms Will Be Posted at [https://formulaires.polytechnique.fr/candidatures/home/](https://formulaires.polytechnique.fr/candidatures/home/)
You must first be nominated by the Caltech Study Abroad Committee.

**DO NOT SUBMIT ANYTHING TO ECOLE POLYTECHNIQUE. EVERYTHING COMES TO FASA.**
Useful Websites

- Ecole Polytechnique Application Forms will be posted in January 2022 at:
  https://formulaires.polytechnique.fr/candidatures/home/

Admissions Process:
https://programmes.polytechnique.edu/en/exchange-programs/international-academic-exchange-program/how-to-apply

- Ecole Polytechnique Course Catalog:

- Caltech Program Info & Application Materials:
  Go to fasa.caltech.edu and click on study abroad and Ecole Polytechnique
MSc in Engineering

**Year 3 - Scientific Specialization**

**Aims:** The third year is centered on scientific specialization. During the first two terms students have to choose a set of courses in a specialized domain:

- Applied mathematics;
- Biology;
- Chemistry at Frontiers;
- Cognition and Complex Systems Science;
- Computer Science;
- Economics;
- Electrical Engineering;
- Energies for the Challenges.

This "Scientific Specialization Program" is completed by instruction in the Humanities and Social Sciences, two Foreign Languages and Sports.

The third term is dedicated to a three-to-five-month research internship allowing students to develop a scientific project in an academic or corporate research environment.

**Specialization trainings:**

- Biology
- Bioinformatics
- Chemistry at frontiers
- Economics
- Electrical Engineering
- Energies of the XXIst Century
- Informatics
- Engineering and Innovation Technologies
- Mathematics
- Applied Mathematics
- Mechanics
- Physics
- Cognition and Complex Systems Science
- Sciences for the Environmental Challenges

**3rd semester:**

- Advanced Research Internship

**Humanities and Social Sciences:**

- Humanities and Social Sciences (3rd Year)

**Last Modification:** Wednesday 25 July 2012
MSc in Engineering

**Mechanics**

**Aims:**

**Program Contents:**

**Period 1 - Fall**

Choose 3 main courses

- Biofluid Mechanics and Mass Transport
- Plasticity and Fracture
- Computational fluid dynamics
- Stability of Solids: from Structures to Materials
- Compressible aerodynamics
- Instability and turbulence
- Earth dynamics: magnetism, earthquakes, volcanoes, tsunamis
- The Finite Element Method for Solid Mechanics
- Laboratory research project
- Physical bases of the mechanical behaviour of solids
- Soft surfaces

Choose 1 specialization course

- Laboratory research project
- Acoustics and sound environment
- Inverse problems
- Smart materials in Robotics and Microtechnology
- Complex Materials
- Aerodynamics

**Period 2 - Winter**

Choose 3 main courses

- Control: Basic concepts and applications in mechanics
- Optimal design of structures
- Propulsion
- Fluid-structure interactions
- Inelastic Analysis of Structures
- Slender structures
- Micro-scale viscous flows and complex fluids
- Heat transfer and fluid flow
- Physical hydrodynamics for environment
- Structural Dynamics
- Laboratory research project
- Physics of biological polymers and membranes

Choose 1 specialization course

- Laboratory research project
- Projects in structural and fluids mechanics
- Hydrodynamics and Elasticity
- Biomechanics in Health and Disease
- Smart materials: multiscale modelling and applications
MEC555 Instabilities and turbulence

Scope

Instability, unpredictability and disorder are very often encountered in natural, technological, ecological, economic and social systems with important consequences on forecasting, design and decision making. These concepts have been historically introduced in the study of the laminar-turbulent transition in fluid flows, where they still represent an active field of research. Some questions of interest in this context are: Why 'laminar' solutions, having a maximum degree of symmetry, become unstable and are replaced by less symmetric solutions? What are the reasons of unpredictability in non-linear systems? Is there anything predictable in turbulent flows?

The scope of this course is to present our current understanding of the answers to these questions.

Instructor
Carlo Cecchi, CNRS-IMFT & Ecole polytechnique
www.enseignement.polytechnique.fr

Contents

- Instabilities originated by unstable stratification: Rayleigh-Bénard and Rayleigh-Taylor instabilities. Instabilities due to centrifugal forces (Taylor-Couette instability). Geophysical and astrophysical applications.

Course taught in English
Last Modification: Saturday 30 June 2023

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Campus Life

• Students live on campus in single dorm rooms
• There is very affordable on campus dining, as well as a kitchen to cook in
• Lots of clubs, and even more sports. Sports are a huge part of campus culture and are required for regular X students
• There is a week-long fall break, or reading week, in mid-October
• Paris is only 40 minutes away by train!
Campus Life

THE CAMPUS IN NUMBERS

1,500 student housing units, 1 on-campus B&B, 1 cafeteria, 1 café

50 classrooms and practical workshops, 15 lecture halls

8,000 m² of indoor sports facilities, including 2 swimming pools, 2 gymnasiums, 1 fencing room, 1 climbing wall, 1 martial arts dojo

8ha of outdoor sports facilities including 1 equestrian center and 1 artificial lake
Campus – lots of student organizations & sports teams

A campus in an exceptional environment

Just 20 km south of Paris, the École Polytechnique campus covers 160 hectares, on which students create numerous initiatives to organize cultural, artistic, social and sports activities through their student organizations.

Campus life is vibrant and offers a wide range of events, including scientific seminars, shows, exhibitions, etc. Events are open to the public: Science Fair, Heritage Days, conferences, etc.
What’s there to do in Paris?

• About a 45 minute train ride from X – you’ll be there every weekend!

• Food (http://www.timeout.com/paris/feature/food/pariss-best-cheap-eats)

• Paris walking tours: https://www.paris-walks.com/index_m.html

• Art!
  – Le Louvre (Mona Lisa, anyone?)
  – Musee d’Orsay (Hey Monet)
  – Centre Pompidou (inside out building)
  – Musee Carnavalet (Paris history – free!)
Napoleon Uniforms
Founded 1794 & Became Military Academy under Napoleon in 1804
Horseback Riding!
Le Lac
Campus View