Civil engineering impacts our daily life....
Civil engineering is in direct connection with society and its actors...

At the surface/at height... Underground... Under extreme conditions...
Civil engineering faces the major challenges of our times...

Secure and sustainable development

Transdisciplinary approach and energetical efficiency

New materials and new construction concepts & management
The EPFL curriculum in Civil engineering

Bachelor of Science in Civil Engineering
Total: 180 ECTS

- Propedeutic cycle
  1 year
  60 credits

- Bachelor Cycle
  2 years
  120 credits

Master cycle
1.5 years
90 credits

Master project (PDM)
1 semester
30 credits

Master of Science in Civil Engineering
Total: 120 ECTS
# Master Curriculum

**MASTER GC (120 ECTS)**

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASTER: 1 ½ year</td>
<td>1.5</td>
</tr>
<tr>
<td>PdM ½ year</td>
<td></td>
</tr>
</tbody>
</table>

**Transverse Subjects (9 ECTS)**

- Construction Law
- Risk Analysis
- Innovation
- Presentation skills...

**OPTIONAL Courses (55 ECTS)**

- Specializations (30 over 45 ECTS listed)
  - Hydraulics
  - Urban Energy
  - Geotechnique
  - Transport and Mobility
  - Structural Engineering

- Minors
  - Territory
  - MTE
  - S+I comput.
  - Imaging
  - IDEAS
  - Energy
  - Sustainability
  - Data Science

- Engineering internship 2 months

- BLOC « projects » - 26 ECTS including SHS (6ECTS)

**Total Credits**

- 90 CDS (9 + 26 + 55)
- 30 ECTS
Five civil engineering specialisations

- Structures
- Geotechnique
- Hydraulics
- Urban Energy
- Transport and Mobility
## Structural engineering

### Our Laboratories in Structural Engineering

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Abbreviation</th>
<th>Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake Engineering &amp; Structural Dynamics</td>
<td>EESD</td>
<td>Prof. Katrin Beyer</td>
</tr>
<tr>
<td>Resilient Steel Structures Laboratory</td>
<td>RESSLAB</td>
<td>Prof. Dimitrios Lignos</td>
</tr>
<tr>
<td>Computational Solid Mechanics Laboratory</td>
<td>LSMS</td>
<td>Prof. Jean-François Molinari</td>
</tr>
<tr>
<td>Intelligent Maintenance &amp; Operations Systems</td>
<td>IMOS</td>
<td>Prof. Olga Fink</td>
</tr>
<tr>
<td>Concrete Behaviour &amp; Structural Design Laboratory</td>
<td>CONSTRUCT</td>
<td>Prof. David Ruggiero</td>
</tr>
</tbody>
</table>
# Geotechnical Engineering

## Our Laboratories in Geotechnical Engineering

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Abbreviation</th>
<th>Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory of Soil Mechanics</td>
<td>LMS</td>
<td>Prof. Lyesse Laloui</td>
</tr>
<tr>
<td>Laboratory of Experimental Rock Mechanics</td>
<td>LEMR</td>
<td>Prof. Marie Violay</td>
</tr>
<tr>
<td>Geo-energy Laboratory – Gaznat Chair on Geo-energy</td>
<td>GEL</td>
<td>Prof. Brice Lecampion</td>
</tr>
</tbody>
</table>
Transport & Mobility

**OUR LABORATORIES IN TRANSPORT & MOBILITY**

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Abbreviation</th>
<th>Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Transport Systems Laboratory</td>
<td>LUTS</td>
<td>Prof. Nikolaos Geroliminis</td>
</tr>
<tr>
<td>Transport &amp; Mobility Laboratory</td>
<td>TRANSP-OR</td>
<td>Prof. Michel Bierlaire</td>
</tr>
<tr>
<td>Visual Intelligence for transportation</td>
<td>VITA</td>
<td>Prof. Alexandre Alahi</td>
</tr>
<tr>
<td>Human Oriented Mobility Eco-System</td>
<td>HOMES</td>
<td>Prof. Kenan Zhang</td>
</tr>
</tbody>
</table>
## Our Laboratories in Hydraulics and Urban Energy

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Laboratory Code</th>
<th>Principal Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plateform of Hydraulic Constructions</td>
<td>LCH</td>
<td>Dr Paolo Perona</td>
</tr>
<tr>
<td>Environmental hydraulics laboratory</td>
<td>LHE</td>
<td>Prof. Christophe Ancey</td>
</tr>
<tr>
<td>The Human-Oriented Built Environment Lab</td>
<td>HOBEL</td>
<td>Prof. Dusan Licina</td>
</tr>
<tr>
<td>Integrated Comfort Engineering</td>
<td>ICE</td>
<td>Prof. Dolaana Khovalyg</td>
</tr>
<tr>
<td>Engineering &amp; Technology for Human-Oriented Sustainability</td>
<td>ETHOS</td>
<td>Prof. Andrew Sonta</td>
</tr>
</tbody>
</table>
Eight recommended Minors

- Integrated Design, Architecture and Sustainability
- Computational Science and Engineering
- Urban Planning and Territorial Development
- Management, Technology and Entrepreneurship
- Energy Management and Sustainability
- Engineering for Sustainability
- Data Science
- Imaging

MASTER GC (120 ECTS)

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  - Innovation
  - Presentation skills...

- OPTIONAL Courses (55 ECTS)
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    - S+I comput.
    - Sustainability
    - Imaging
    - Data Science
  - Engineering internship: 2 months
  - BLOC « projects » - 26 ECTS including SHS (6 ECTS)

90 CDS (9 + 26 + 55) 30 ECTS
Projeter Ensemble

TOWARDS A SUSTAINABLE FUTURE

CIVIL ENGINEERS

ARCHITECTS

ENVIRONMENTAL ENGINEERS & SCIENTISTS

INNOVATIVE

INTEGRATIVE

PROJETER ENSEMBLE
ENAC week
Teaching Unit

Land of a Thousand Dances
Design and build facilities while analyzing the effects of weather and climate on temporary structures

Quartier urbains, infrastructures et aménagements durables
Taught by an interdisciplinary team, this semester-long course focuses on the principles of sustainable urban development
Civil Engineering and SUSTAINABILITY

- Eco materials
- Zero waste
- CO2 storage
- SMART projects
- Recycling
Master Project in Civil Engineering

“Development of Interlocking Composite Bricks Made From Recycled Plastic and Construction Waste” – Selina Heiniger

The objectives of these bricks are:

- Fabrication originate from plastic and construction waste
- Comparable strength, stiffness and water absorption rate to commonly used construction bricks
- Include mortar-free connection system
- Simple and reproducible manufacturing process
- Comparable or lower environmental impacts compared to commonly used construction bricks

<table>
<thead>
<tr>
<th>Material characterisation</th>
<th>Polymer matrix testing</th>
<th>Composite mix testing</th>
<th>Brick wall testing</th>
<th>Life cycle analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Material characterisation" /></td>
<td><img src="image2.png" alt="Polymer matrix testing" /></td>
<td><img src="image3.png" alt="Composite mix testing" /></td>
<td><img src="image4.png" alt="Brick wall testing" /></td>
<td><img src="image5.png" alt="Life cycle analysis" /></td>
</tr>
</tbody>
</table>
“Conception et dimensionnement d’une passerelle”
- Elena Canomeras

- Construction d’une passerelle piétonne reliant le futur quartier «En Dorigny» et le campus UNIL
- Zone à forte mixité fonctionnelle
- Coût de construction estimé à 4.8 Mio
- Structure mixte composée d’éléments en BFUP, en béton et en acier
- Structure principale composée de deux treillis tubulaires tridimensionnels torsadés en acier
- Forme torsadée des treillis développée dans un but d’intégration de la structure avec ses conditions d’appui
- L’addition de panneaux végétalisés permet de protéger les usagers des nuisances des voies de communication tout en apportant de la nature à l’ouvrage
Master Project in Civil Engineering

«Implementation and integration of an evapotranspiration model of vegetation in the Arup microclimate workflow»
Océane Martin

- Select an evapotranspiration model, implement it in the Arup microclimate workflow and validate it
- Apply it on a 3D generic urban geometry to comprehend the design, strategies available to reach local cooling
- Vegetation is the cheapest and most efficient way to mitigate the UHI.
- Plant evapotranspiration can locally cool down the air up to 6°
Master Project in Civil Engineering

«Motion Style Transfer: Modular Low-Rank Style Transfer for Deep Trajectory Forecasting» Danya Li

**Challenge:**
- Despite great success on large-scale datasets, deep forecasting models suffer from inferior performance when they encounter unseen novel scenarios

**Research problem:**
- Efficiently adapt a forecasting model pretrained on source domain with sufficient data to a target domain

**Contributions:**
- Formulate motion adaptation as style transfer
- Motion style adapters to model the style shifts
- Modularized strategy to improve sample efficiency

Decoupling motion dynamics:
- Physical laws behind motion dynamics are invariant.
- Only need to account for the changes in motion style.
The EPFL Diploma in Civil Engineering

Guarantees an excellent scientific basis and a great capacity to understand and solve new complex engineering problems

Highly recognized diploma at national and international level
The professional insertion of the new EPFL graduates in Civil engineering

First job research:

<table>
<thead>
<tr>
<th>Section (Master)</th>
<th>Average number of applications</th>
<th>Average period of job research, in weeks</th>
<th>Average number of proposed positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil engineering</td>
<td>4 (14)</td>
<td>4.0 (14)</td>
<td>2.0 (14)</td>
</tr>
</tbody>
</table>

Satisfaction at work (first job): high to very high 97%

Global Satisfaction

- 18% very high
- 54% high
- 25% normal

Source: EPFL Career center, Promotion 2020
The civil engineer profile

Professions
Design engineer
Field engineer
Operational engineer
Research and development engineer

Employers
Engineering consultants
Building firms
Administrations
Industries
Research centers
Governmental authority employers

Activities
Research
Planification
Conception, Design
Calculations, Modelling
Construction
Project Management
Maintenance

Projects
Bridges, Dams, Buildings
Water and Energy Facilities
Transport infrastructures and systems
Resources management
Natural hazards and risks

Personnal qualities
enterprising
sociable
creative
responsible
pragmatic
technically skilled
open minded
solution oriented
creative
enterprising
sociable
creative
responsible
pragmatic
technically skilled
open minded
solution oriented

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