

CIVIL-126

**Drawing structures**

Baur Raffael, Corres Sojo Enrique, Fernandez-Ordoñez David, Guaita Patricia

Cursus	Sem.	Type
Civil Engineering	BA1	Obl.

Language of teaching	English
Coefficient	3
Session	Winter
Semester	Fall
Exam	During the semester
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Lecture	1 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

The Drawing Structures I will introduce the basic drawing techniques (sketch, plan, section, elevation, and axonometry) to the first-year engineers. Based on these techniques, we will further investigate analytical drawing methods capable of exploring projects, structural concepts and their solution

**Content**

**1. Linear projections:** We will begin with the "projections de Monge", a technique that allows to construct plan, section and elevation simultaneously and in reciprocal relation. Learning to read a three-dimensional reality in two dimensions without immediate visualization in 3D fosters essential skills such as spatial relationship, visualization and precision. Monge's projection technique helps to construct points and lines on the paper. It introduces the first concepts of scale, proportion, transparency, and composition. With only points and lines, the relationships between plan and sections are established. The construction lines remain and create other unforeseen spaces.

**2. Tactile details:** By examining details as individual fragments, students dive into the dimensions and articulations of structural elements in various scales. Through the process of exposing these parameters on paper during the analysis or design phase, students gain access to multiple dimensions encompassing space, materiality and structure. These processual drawings foster an understanding of the significance of detail and its influence on the project. Drawing tactile details will cultivate a heightened spatial sensitivity, encouraging the active integration of detail in the conceptual early stages of a project.

**3. Spatial axonometries:** Explorations are conducted using axonometric projections, allowing for the examination of notions like depth and transparency directly on the paper. The slow weaving of lines helps experience spatial fragments and their construction. This threefold way of drawing as construction will build up tacit knowledge about proportion and space, key notions of interest in the culture of the design project.

**Keywords**

Analytical drawing methods; tactile working drawings; design process; structure and tectonics; tacit knowledge.

**Learning Prerequisites****Important concepts to start the course**

Draw by hand

**Learning Outcomes**

By the end of the course, the student must be able to:

- Analyze capacity to use analysis as a means of advancing and structural idea.
- Draw ability to work in drawing as construction.

- Investigate and understand structural elements.
- Discuss with an interdisciplinary team.
- Take into consideration participation, initiative, responsibility.

### Transversal skills

- Communicate effectively, being understood, including across different languages and cultures.
- Communicate effectively with professionals from other disciplines.
- Demonstrate a capacity for creativity.
- Demonstrate the capacity for critical thinking

### Teaching methods

Students will draw by hand with pencil on A1 paper. Drawing will be questioned in its double dimension both as action and as operational technique, with the capacity to foster a unique and complex form of thought that incorporates mental abstraction and intuitive comprehension. We will help the students to rediscover the pencil as an extension of their body, allowing them to draw without intermediary interfaces, without distraction. The objective is to construct drawings that possess a tacit value and emotional quality. Precision, patience, and dedication are promoted, fostering shared knowledge. The term "metadrawing" will be introduced to name a processual drawing with a certain degree of complexity. Creating such drawings requires time. This type of drawing permits multi-scalar explorations on a single or double sheet of paper. It allows investigations on construction, structure and space using a variety of techniques while maintaining a condition open to change throughout the design process. This approach establishes a dynamic that attempts to overcome linear and closed sequences of representation. Students will draw in an atelier format, explore, examine, discuss, share and build up explicit and implicit (tacit) knowledge.

### Expected student activities

Learn to construct precise plans, sections, elevations, details and axonometric projections; to understand the logic of two-dimensional planes and their implications in three-dimensional space; to investigate the meaning and implication of scale; to analyse the structural and tectonic logic of a given project by means of an adequate analytical drawing method; the ability to use drawing as a tool of analysis and design.

### Assessment methods

Ongoing evaluation: students will be evaluated on the basis of the objectives stated in learning outcomes (travail attendu) as well as their engagement and collaboration.

### Supervision

Office hours	Yes
Assistants	Yes

### Resources

#### Virtual desktop infrastructure (VDI)

No

#### Bibliography

- Berger, J. (2008). *Ways of seeing*. Penguin UK.
- Billington, D. P. (1979). *Robert Maillart's bridges: The art of engineering*. Princeton University Press
- Billington D. P. (1985). *The tower and the bridge: The new art of structural engineering*. Princeton University Press
- Billington D. P. (2003). *The art of structural design. A Swiss legacy*
- Boudon, P. (1984). *Images et imaginaires Architecture*. Paris: Pompidou.
- Cruz, F. (2003). *Sobre la observacion*. Vina Del Mar Escuela de Arquitectura y Diseno PUCV.
- Farnham, J. E. (1999). *Robert Maillart: Builder, Designer, and Artist*. Technology and Culture,

40(1),154-156

Figi, H., & Menn, C. (2009). Christian Menn, Braoeckenbauer (Vol. 3). vdf Hochschulverlag AG.

Guaita, P. (2023). Accion y experiencia en la arquitectura. Materia y corporalidad en la ensenanza de la era tecnologica

Guaita, P., & Baur, R. (2023). Notes on Drawing: Interior material lines. Drawing in Architecture Education and Research

Marti, P., & Maillart, R. (2007). Robert Maillart: Beton-Virtuose. Vdf Hochschulverlag AG.

Perez-Gomez, A., & Pelletier, L. (1997). Architectural representation and the perspective hinge. Mit Press Cambridge, MA

Rice, P. (2024). An engineer imagines. Batsford Books

Scharer, C., & Menn, C. (2015). Christian Menn-Brucken = Christian Menn-Bridges. Scheidegger & Spiess

Schon, D. A. (2017). The reflective practitioner: How professionals think in action. Routledge.

Simonnet, C. (2013). Robert Maillart et la pensee constructive. Infolio

Spiro, A., & Ganzoni, D. (2013). The Working Drawing. The Architectas Tool.

#### Notes/Handbook

<https://infoscience.epfl.ch/record/288716?ln=fr&v=pdf>

<https://infoscience.epfl.ch/record/299725?ln=fr&v=pdf>

<https://infoscience.epfl.ch/record/306262?ln=fr&v=pdf>

#### Moodle Link

- <https://go.epfl.ch/CIVIL-126>

#### Prerequisite for

Students have to acquire a drawing material kit ( infos send by email) before coming to the course.