

CIVIL-413

**Urban hydraulic systems**

Pfister Michael

| <b>Cursus</b>                        | <b>Sem.</b> | <b>Type</b> |
|--------------------------------------|-------------|-------------|
| Civil Engineering                    | MA2, MA4    | Opt.        |
| Energy Management and Sustainability | MA2, MA4    | Opt.        |

|                            |                 |
|----------------------------|-----------------|
| Language of teaching       | English         |
| Credits                    | 3               |
| Session                    | Summer          |
| Semester                   | Spring          |
| Exam                       | Oral            |
| Workload                   | 90h             |
| Weeks                      | 14              |
| <b>Hours</b>               | <b>3 weekly</b> |
| Courses                    | 2 weekly        |
| Exercises                  | 1 weekly        |
| <b>Number of positions</b> |                 |

**Summary**

The basic features of fresh water and sewer nets are considered. For fresh water, the capture, the reservoir and the distribution net are discussed. For sewers, conduit and manhole hydraulics is in the focus. Besides, the legal background is provided and methods to derive the relevant discharges.

**Content****General introduction to urban hydraulics**

- Legal and conceptual aspects, including common concepts of fresh and waste water nets
- Design bases related to fresh water consumption, storm water run-off and dry-weather discharge in sewer
- Introduction to flood retention with hydraulic design of components
- Introduction to structural design of conduits and to maintenance

**Focus on fresh water**

- Capture
- Reservoirs
- Supply net hydraulics

**Focus on wastewater hydraulics**

- Hydraulic design of sewer conduit
- Standard manhole
- Special manhole: Drop and junction
- Sewer sideweir and bottom opening
- Culverts, throttling pipes and inverted siphons
- Sewage pumping

**Keywords**

urban hydraulics, sewer, fresh water, reservoir, manhole, wastewater, hydraulics

**Learning Prerequisites****Recommended courses**

Fluid mechanics I et II  
Hydraulic structures and schemes I  
Hydraulic and energy networks

### Learning Outcomes

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

- Describe the objectives of urban hydraulic systems
- Analyze the legal environment of urban hydraulic networks
- Assess / Evaluate the sewer types and existing systems
- Elaborate relevant discharges
- Characterize fresh water supply nets, captures and reservoirs
- Design sewer pipes considering all related phenomena
- Estimate the hydraulically correct dimensions of manholes
- Compose urban hydraulic nets out of the relevant elements

### Transversal skills

- Set objectives and design an action plan to reach those objectives.
- Respect relevant legal guidelines and ethical codes for the profession.
- Take responsibility for environmental impacts of her/ his actions and decisions.
- Make an oral presentation.

### Teaching methods

Course with exercises, examples, a field visit and presentations given by external experts

### Expected student activities

To read literature and book chapters, to present results

### Assessment methods

Oral exam

### Supervision

|              |    |
|--------------|----|
| Office hours | No |
| Assistants   | No |
| Forum        | No |

### Resources

#### Bibliography

Is provided at course begin

#### Notes/Handbook

Slides and Books

#### Moodle Link

- <http://moodle.epfl.ch/course/view.php?id=13161>

### Prerequisite for

Master Thesis in the field