

CIVIL-413

Urban hydraulic systems

Pfister Michael

Cursus	Sem.	Type
Civil Engineering	MA2, MA4	Opt.
Civil engineering minor	E	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.

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

Summary

Sustainable freshwater and urban drainage system are considered. Fresh water: capture, reservoir and net. Drainage: hydrology, sponge city, individual conduit and manhole hydraulics. The integral rain water management and the legal frame are further key elements

Content**General introduction to urban hydraulics**

- Legal and conceptual aspects, including common concepts of freshwater and wastewater nets
- Sustainable design respecting the natural water cycle and reducing the pollution outfall
- Approaches to reduce the runoff generation, via evapotranspiration and infiltration (sponge city)
- Design bases related to fresh water consumption, storm water and dry-weather discharge in sewer
- Introduction to flood retention with hydraulic design of components
- Overview on literature and activities of competent organizations

Focus on fresh water

- Systems with consumption and production, with measures to reduce both
- Capture
- Reservoirs
- Supply net hydraulics

Focus on wastewater hydraulics

- Hydraulic design of sewer conduit
- Standard manhole
- Special manhole: Drop and junction, sewer side weir and bottom opening

Keywords

Sustainability, Urban water, Sewer, Hydraulics, Urban drainage, Fresh water

Learning Prerequisites**Required courses**

Fluid mechanics

Recommended courses

Hydraulic structures and schemes

Important concepts to start the course

Basic physics and hydraulics

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, and presentations

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

- <https://go.epfl.ch/CIVIL-413>