

ENV-526

**Climate and water sensitive urban design**

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Cursus	Sem.	Type
Architecture	MA2, MA4	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.
Territories in transformation and climate minor	E	Opt.
Urban Planning and Territorial Development minor	E	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Project	2 weekly
<b>Number of positions</b>	

**Remark**

Cours sur 12 semaines

**Summary**

This project-based course introduces students to the field of urban climate and hydrology, with a focus on nature-based solutions for the design of climate and water resilient cities.

**Content**

## PART 1: Climate

- Cities and global climate change
- Introduction to urban climate (airflow, radiation, energy balance)
- Urban heat and dry islands
- Air pollution
- Climate sensitive design

## PART 2: Water

- Introduction to urban hydrology
- Runoff modelling, flood risk and mitigation
- Conventional vs Sustainable Urban Drainage Systems
- Water sensitive design

**Keywords**

Urban Climate, Urban Hydrology, Nature-Based Solutions, Green Infrastructures, Resilient Cities

**Learning Outcomes**

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

- Explain how cities modify land surface processes on multiple temporal and spatial scales
- Quantify the physical processes governing the climate and hydrology of cities (e.g., urban heat and dry islands, air pollution, runoff generation, flood risk)
- Apply urban physics concepts in urban design
- Propose nature-based solutions to design more sustainable and resilient cities

## Transversal skills

- Use a work methodology appropriate to the task.
- Communicate effectively with professionals from other disciplines.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Identify the different roles that are involved in well-functioning teams and assume different roles, including leadership roles.
- Write a scientific or technical report.
- Take account of the social and human dimensions of the engineering profession.
- Access and evaluate appropriate sources of information.

## Teaching methods

Weekly lectures (L): carried out at the blackboard and with the aid of projected material

Weekly design tutorials/exercises (E): students will work in multidisciplinary teams on a group project for the entire duration of the course

## Assessment methods

40% Individual in-class test

60% Group project (40%) with individual components (20%)

## Resources

### Bibliography

Oke, T. R., Mills, G., Christen, A., & Voogt, J. A. (2017). Urban climates. Cambridge University Press (available online).

Guo, J. C., Wang, W., & Li, J. (2022). Urban Drainage and Storage Practices. CRC Press (Available online).

## Ressources en bibliothèque

- [Oke, T. R., Mills, G., Christen, A., & Voogt, J. A. \(2017\). Urban climates. Cambridge University Press](#)
- [Guo, J. C., Wang, W., & Li, J. \(2022\). Urban Drainage and Storage Practices. CRC Press](#)