EPFL

ENV-221	**Hydrology for engineers**
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Cursus	Sem.	Type
Civil Engineering	BA5	Opt.
Environmental Sciences and Engineering	BA5	Obl.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
Hours	**5 weekly**
Lecture	3 weekly
Exercises	2 weekly
Number of positions	

Summary

"Hydrology for Engineers" is an introduction to the study of floods, droughts and a fair distribution of water. The course will introduce basic hydrologic concepts and methods: probability and statistics, surface and subsurface hydrological processes

Content

1. Introduction. Hydrologic cycle. Hydrologic processes
2. Precipitation I: Types, variability, characterization.
3. Precipitation II: Frequency analysis and return period
4. Evaporation and plant transpiration
5. Infiltration and soil processes
6. Surface hydrology I: runoff and streamflow
7. Surface hydrology II: hydrologic response and IUH
8. Subsurface hydrology I: saturated flow. Porous formations. Well hydraulics.
9. Subsurface hydrology II: saturated flow. Porous formations. Well hydraulics.
10. Floods I: Hydrologic and hydraulic design
11. Floods II: Hydrologic and hydraulic design
12. Droughts: water scarcity, scenarios of climate change, vegetation stress
13. Towards a fair distribution of water: streamflow, principles of ecohydrology
14. Principles of hydrologic transport: residence time distributions, basin scale transport

Keywords

Hydrology, hydrologic design, hydrologic model, floods

Learning Prerequisites

Recommended courses

Elementary Fluid Mechanics; Hydraulics (in particular, Open Channel Flow)
Informatics and programming (especially in MATLAB)
Science du sol

Important concepts to start the course

The student should keep in mind the twofold aim of the course: explore the large engineering impact of hydrologic design; and appreciate the great scientific questions currently debated

Learning Outcomes

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

- Predict hydrologic extremes at a certain location (elementary methods)
- Carry out basic hydrologic computations
- Implement basic hydrologic models
- Explore limits and validity of hydrologic methods
- Compare different methodologies
- Analyze hydrologic data
- Characterize the main hydrologic features of a certain site

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Set objectives and design an action plan to reach those objectives.
- Demonstrate the capacity for critical thinking

Teaching methods

- Weekly Lectures, carried out at the blackboard and with the aid of projected material
- Weekly exercises, partly in class and partly in a computer room using the software MATLAB. Homeworks are supervised but not evaluated by the teacher.
- 2 Assignments, to be carried out in groups of 2

The additional reading is the textbook employed in the Water Resources Engineering class, an international standard on the subject to which EPFL students are intended to be aligned. (Copies of the book to borrow are available, besides the Library, upon request to the ECHO laboratory secretary)

Expected student activities

Plan and carry out activities in a way which makes optimal use of available time
Set objectives and design an action plan to reach those objectives.
Use a work methodology appropriate to the task. Regular attendance to classes and exercise sessions and a moderate amount of homework should suffice to complete the class requirements in a satisfactory manner
Programming will be required.

Assessment methods

- Assignment I (10%)
- Assignment II (10%)
- Mid term exam (20%)
- Final written exam (60%)

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes
Others	Please contact the teachers by e-mail to fix an appointment

Resources

Bibliography
Slides/Class Notes
Support textbook: Water Resources Engineering, Larry W. Mays. 2nd Revised edition, 2010, Wiley & Sons,

ISBN 978-0-470-46064-1

Ressources en bibliothèque

• Water Resources Engineering / Mays

Notes/Handbook

Essentials for completion of the course will be self-contained in the Class notes -- uploaded weekly through the Moodle Platform

Moodle Link

• https://go.epfl.ch/ENV-221

Prerequisite for

Water Resources Engineering (ENV-424)