ENV-221

Hydrology for engineers

Rinaldo Andrea

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	**4 weekly**
Courses	3 weekly
Exercises	1 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 to hydrologic materials and methods: fluid mechanics (including open channel flow), probability and statistics, surface and subsurface hydrological processes

Content

1) Introduction. Hydrologic cycle. Hydrologic processes
2) Precipitation: Types, variability, characterization. Evaporation. Infiltration.
3) Surface hydrology: runoff and streamflow. Rainfall excess. Hydrologic response.
6) Surface hydrology: Reservoir and streamflow routing.Open channel hydrology
7) Probability and statistics in hydrology. Return Period. Frequency analysis, risk
8) Subsurface hydrology: saturated flow. Porous formations. Well hydraulics.

Learning Prerequisites

Recommended courses

Elementary Fluid Mechanics; Hydraulics (in particular, Open Channel Flow)

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 teh great scientific questions currently debated

Learning Outcomes

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

- Structure hydrologic models
- Carry out hydrologic calculations
- Compute hydrologic extremes (elementary methods)
- Design return period for hydrologic events
- Prepare for advanced design of water resources engineering
- Explore limits and validity of hydrologic methods
- Compare hydrologic methods

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.

Teaching methods

Use of power point aids will be made, also reproducing several Figures of the textbook for clarity and completeness.
Extensive use of the blackboard for all analytical developments.
The textbook is chosen purposedly because it is the one employed in the ENV-221 Class in Water Resources Engineering, an international standard on the subject to which EPFL students are intended to be aligned. (Copies of the textbook to borrow are available, besides the Library ones, upon request to: anna.rothenbuehler@epfl.ch)
Assess progress against the plan. Students will be probed to adapt the plan as appropriate.

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
Knowledge of Matlab is recommended. Programming will be required.

Assessment methods

Homework (30%)
Mid term exam (20%)
Final written exam 120 min (50%)
Homework supervision by the course assistants is guaranteed. Teacher available in office hours and upon appointment (contact directly: andrea.rinaldo@epfl.ch)

Supervision

Office hours	Yes
Assistants	Yes
Forum	No
Others	Assistant to the course are: Paolo Benettin (paolo.benettin@epfl.ch) Flavio Finger (flavio.finger@epfl.ch) Weekly supervision of course work by the course assistants is guaranteed. Teacher available in office hours and upon appointment (contact directly: andrea.rinaldo@epfl.ch)

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

- http://moodle.epfl.ch/enrol/index.php?id=2481

Prerequisite for