

ENV-424

Water resources engineering

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Cursus	Sem.	Type
Energy Science and Technology	MA1, MA3	Opt.
Environmental Sciences and Engineering	MA1, MA3	Opt.

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

Summary

Water resources engineering designs systems to control the quantity, quality, timing, and distribution of water to support human demands and the needs of the environment.

Content

- Water use and water withdrawals;
- Crop and irrigation water needs;
- Multipurpose water reservoir design and management (irrigation, water use, flood control, energy production);
- Review of principles of fluid mechanics for pipe flow;
- Water distribution networks;
- Pumps and turbines: characteristics and operating points;
- Hydropower production;
- Model of rainfall generation for Monte Carlo approaches;
- Flood control;
- Environmental flow;
- Multicriteria optimization;
- Water resources & climate change.
- Advanced topics in water resources engineering

Keywords

Hydrologic modeling; water management; floods; droughts; distribution of water

Learning Prerequisites**Recommended courses**

Hydrology, elementary fluid mechanics, MatLab

Learning Outcomes

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

- Model the continuous functioning of a multipurpose reservoir
- Design water reservoir for generic input and output flow timeseries

- Estimate irrigation water needs and irrigation water withdrawals
- Estimate hydropower production
- Design distribution networks
- Predict the effect of flood control measures
- Implement and code simple conceptual hydrological models
- Compute the operating point of a pump
- Estimate the potential energy produced by a hydropower plant
- Develop models of synthetic rainfall

Transversal skills

- Use both general and domain specific IT resources and tools

Teaching methods

Ex cathedra teaching, exercises

Expected student activities

- Attendance at lectures
- Weekly exercises
- Semester assignment

Assessment methods

Homework assignment 30%, Final exam in the post-semester exam period 70%

Resources

Bibliography

Slides of Lectures

Support Textbook: Mays L.W., Water Resources Engineering, Wiley, New York, 2005

Ressources en bibliothèque

- [Water Resources Engineering/ Mays](#)

Moodle Link

- <https://go.epfl.ch/ENV-424>