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%

Supervision
Office hours  Yes
Assistants  Yes

Resources
Bibliography
Slides of Lectures

Ressources en bibliothèque
• Water Resources Engineering/ Mays

Moodle Link
• http://moodle.epfl.ch/enrol/index.php?id=2801