

ENV-405

**Water and wastewater treatment**

Holliger Christof, von Gunten Urs

Cursus	Sem.	Type
Energy Management and Sustainability	MA1, MA3	Opt.
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
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

This course on water and wastewater treatment shows how to implement and design different methods and techniques to eliminate organic matter, nitrogen and phosphorus from wastewater, and how to apply physical and chemical methods and techniques to produce drinking water.

**Content****Water quality**

Water resources, raw water composition, drinking water regulations

**Principles of drinking water production**

Physico-chemical processes, oxidation, disinfection, adsorption processes, membrane technologies, biological processes.

**Process combinations for drinking water treatment**

Evolution of treatment trains, standard process combinations, water re-use systems

**Principles of organic and inorganic pollutants removal from wastewater**

Primary, secondary and tertiary treatment, uncoupling the hydraulic and sludge residence time.

**Activated sludge and immobilized biomass wastewater treatment plants**

Operational principles and process diagrams, structure, biology, process configurations.

**Elimination of nutrients**

The microbial and chemical processes for the removal of nitrogen and phosphorus from wastewater.

**Learning Prerequisites****Required courses**

Environmental chemistry; Microbiology for engineers; Process engineering; Sanitary engineering, water and waste management

**Learning Outcomes**

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

- Interpret data on parameters of water and wastewater
- Verify the design of a classical wastewater treatment plant
- Optimize nutrient elimination in a wastewater treatment plant
- Propose a solution for wastewater treatment with the correct design
- Assess / Evaluate quantitatively unit processes for drinking water treatment
- Propose adequate process combinations for drinking water treatment
- Link raw water quality with drinking water treatment

### **Teaching methods**

Lectures ex cathedra and exercises

### **Assessment methods**

Two written mid-term exams during the semester (40 % of the final note) and one final written exam (180 min) during the winter session exam period (60 % of the final note).

### **Prerequisite for**

Environmental bioprocess design