

PR2100

Water Treatment and Underground Water Protection

Professor: Arezou Modaressi

Language of instruction: French – **Number of hours:** 36 – **ECTS:** 3

Prerequisites: None

Period: S8 Elective 12 March to June IN28IE5, SEP8IE5

Course Objectives

This course aims to study and understand the interactions between mankind and the water drawn from nature, in particular:

- ✧ the processes used to produce or treat water after its use (urban wastewater, industrial effluents) of a given quality (drinking water, water used in processes).
- ✧ the study of underground water and its treatment and protection management with respect to the dynamics of contaminants, monitoring and decontamination techniques.

On completion of the course, students should be able to

- ✧ know the methods for analysis, treatment and production of water with a given quality
- ✧ design a part of such installations
- ✧ understand the hydraulics of underground water and related aspects and parameters
- ✧ understand the transport and transfer mechanisms of different types of pollutants in ground water and be able to model them
- ✧ know the main management and treatments techniques according to the type of pollution

Course Contents

- ✧ Introduction: availability of water, laws, standards, biological and physicochemical processes for treating water and effluents (6 hr),
- ✧ Introduction to hydrogeology, contaminants and their dynamics in underground water, ground water management, monitoring and treatment of polluted sites (3hr),
- ✧ Modelling hydraulics and mechanisms of transport and transfer of pollutants in groundwater (6 hr),
- ✧ Labwork on numerical simulation of underground water protection and pollution case studies (9 hr),
- ✧ Labwork on water analysis and treatment processes or exercises on design of installations, depending on availability of equipment (9 hr).

Course Organization

Tutorials: 15 hr, Labwork: 18 hr, Exam: 3 hr

Teaching Material and Textbooks

PowerPoint presentations

Scientific papers

Internet websites

Resources

Arezou Modaressi supervisor responsible

Barbara Malinowska responsible for process Labwork

external teachers

comsol-Multiphysics software

Labwork at LPGM

Evaluation

- ✧ (50%)Written exam (3 hr)
- ✧ (25%)Brief lab reports
- ✧ (25%)Synthetic reports on numerical simulation labwork and the case study