### Bibliography


### Course objectives

The main objective of the course is to cover the theory and application of all the techniques applied to groundwater management. The course is a combination of groundwater flow and mass transport simulation with theory of operation research and specifically with optimization methods for the solution of linear and non-linear environmental management problems.

### Syllabus

1. **1st Week:**
   A brief review to the basics of groundwater hydraulics

2. **2nd Week:**
   The joy of modeling – Basic steps and guidelines

3. **3rd Week:**
   Equations of groundwater flow and mass transport –Analytical solutions

4. **4th Week:**
   Modeling the groundwater flow and mass transport –Numerical solutions

5. **5th Week:**
   Finite differences and finite elements groundwater simulators

6. **6th Week:**
   Introduction to Princeton Transport Code (PTC)
7th Week:
Using PTC on a field case – groundwater flow
8th Week:
Using PTC on a field case – groundwater contaminant transport
9th Week:
Introduction to optimization
10th Week:
Linear programming environmental problems
11th Week:
Non-Linear programming environmental problems
12th Week:
Groundwater optimal design problems
13th Week:
Groundwater optimal design problems

Work load
Two projects, oral presentation and final exam

Student evaluation
1. Projects (60%)
2. Oral Presentation (20%)
3. Final exam (20%)