Groundwater Hydraulics

1. **Course number and name:** 020HSOGS5 Groundwater Hydraulics

2. **Credits and contact hours:** 4 ECTS credits, 2x1.25 hours

3. **Name(s) of instructor(s) or course coordinator(s):** Adel ABOU JAOUDE

4. **Instructional Materials:**

    a. Freeze, R. A., and J. A. Cherry (1979), Groundwater, edited, New Jersey,
    b. Prentice-Hall Inc., TIC, Englewood de Marsily, G. (1986), Quantitative Hydrogeology, Academic Press Inc., Orlando, Florida. (also available in French: http://www.sisyphe.upmc.fr/~m2hh/hydr/marsily/gdm-hydrogeologie.pdf)
    c. Instructor's Class Notes

5. **Specific course information**
    a. Catalog description: Provide the necessary elements to: quantify the groundwater flow in confined and unconfined aquifers; estimate the rates of seepage under dam structures; design and dimensioning of drills; interpret pumping tests; quantify solute and pollutant transport in simple configurations.

    b. Prerequisites or co-requisites: None

    c. Required: Required major course for Water and Environment Specialty students

6. **Educational objectives for the course**
    a. Specific outcomes of instruction:
        - Introduce the students to the concepts of groundwater hydraulics and resources management
        - Develop the theoretical background needed for analyzing groundwater flow and seepage
        - Present students the needed methods to interpret pumping tests
        - Expose students to field drilling methods
        - Familiarize students with numerical methods and groundwater modeling
        - Introduce the students to basic theory of pollutant transport in porous media
        - Enhance the students' writing and oral presentation skills
    b. PI addressed by the course:

PI	1.1	1.4	2.3	3.1
Covered	yes	yes	yes	yes
Assessed				

7. Brief list of topics to be covered:

1. Introduction (2 hours)
2. Darcy's law (2 hours)
3. Groundwater flow (8 hours)
4. Groundwater flow modeling (6 hours)
5. Field drilling methods (2 hours)
6. Pumping well hydraulics (8 hours)
7. Pollutant transport (2 hours)