Advanced General Chemistry

1. **Course number and name:** 020CHACI3 Advanced General Chemistry

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Name(s) of instructor(s) or course coordinator(s):** Jihane Rahbani

4. **Instructional materials:** Course handouts; in-class problems
   Reference : Chimie tout-en-un MP/PT, J'intègre-Dunod

5. **Specific course information**
   a. **Catalog description:**
      The overall aim of this course is to provide students with the basic principles of chemical thermodynamics as well as electrochemistry including the laws of thermodynamics; enthalpy, entropy, internal energy, free energy, chemical potential, phase equilibria; equilibrium constant; Characterization of the intensive state of a system in equilibrium: variance of a system in equilibrium. Optimization of a chemical process; Overvoltage: Current-potential curves; Spontaneous transformations; Batteries and electrolyzers; Mixed potential, Corrosion potential, Corrosion current intensity, Uniform corrosion in acidic or neutral oxygenated medium; Differential corrosion by heterogeneity of the support or the environment; Protection against corrosion.

   b. **Prerequisites:** 020CHGCI1 General Chemistry

   c. **Required/Selected Elective/Open Elective:** Required

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
      - Master the fundamental notions of thermodynamics and use the appropriate language precisely.
      - Describe the evolution and energy exchanges of a system during a chemical reaction.
      - Predict the evolution of a chemical equilibrium following a disturbance.
      - Recognize the different types of reactions likely to occur in aqueous solution, express and calculate their equilibrium constants.
      - Use the i=f(E) curves in the determination of thermodynamic and kinetic information about electrochemical systems.

   b. **PI addressed by the course:**

PI	1.3
Covered	x
Assessed	x

7. **Brief list of topics to be covered**
   - Applications of the thermodynamics principles to the chemical reaction in a closed system leading to the study of chemical equilibrium.
   - Chemical potential, free enthalpy, chemical affinity, equilibrium constant, variance, displacement and disruption of equilibrium
   - Optimization of a chemical process
   - Kinetics of electrochemical reactions - Current-potential curves
   - Electrochemical nature of corrosion