General Chemistry

1. **Course number and name:** 020CHGNI1/020GCHNI1 General Chemistry

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

3. **Names of course coordinators:** Tala Kanson, Roger Matta

4. **Instructional materials:** Slides; in-class problems; lab experiments

5. **Specific course information**
   a. **Catalog description:**
   This course allows students to master acid-base balances, the preponderant reaction method, and the calculation of pH in the final state of chemical equilibrium as well as pH-metric titrations. In addition, notions about oxidants and reductants, the electrochemical cell, the type of electrodes, the calculation of the electromotive force and the capacity of the cell, the potential of the electrode through the Nernst equation as well as titration by oxidation-reduction reaction are covered. Students also learn the concept of heterogeneous equilibrium in aqueous solution, the effect of the common ion and complexation on solubility, complexation reactions and the influence of pH on solubility. Finally, this course allows analyzing potential-pH diagrams through examples along vertical and horizontal lines.

   b. **Prerequisites:** None

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

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
   - Calculate the pH of strong and weak acids and bases, weak acid/conjugated base, weak acid/unconjugated base, ampholyte, etc. at the final state of chemical equilibrium.
   - Carry out a strong acid/strong base and weak acid/strong base titration by colorimetric and pH-metric methods in order to detect the equivalence point.
   - Calculate the potential of an electrode through the Nernst equation, and the capacity of an electrochemical cell.
   - Perform a titration by oxidation-reduction reaction to detect the equivalence point.
   - Calculate the solubility of a solid, and analyze the effect of a common ion and the complexation on the solubility.
   - Write the preponderant re-dissolution reaction of the precipitate.

- Analyze Pourbaix diagrams through various examples according to vertical and horizontal lines.
- Know how to locate the elements on the potential-pH diagrams according to immunity, passivity and corrosion zones.
- Know how to calculate the slope of a straight line in a Pourbaix diagram.

b. PI addressed by the course:

PI	1.3
Covered	x
Assessed	x

7. Brief list of topics to be covered

- Chapter 1: acid/base balance, titration (5 lectures), exercises (2 lectures)
- Chapter 2: Oxidation-Reduction (4 lectures), exercises (2 lectures)
- Chapter 3: Solubility Equilibrium (4 lectures), exercises (2 lectures)
- Chapter 4: potential-pH diagram (3 lectures), exercises (2 lectures)