# *ELECTROCHIMIE ET CHIMITRONIQUE.*

## ELECTROCHEMISTRY AND CHEMITRONICS

**Lecturers:** Naoufel HADDOUR

| Lecturers : 12.0 | TC : 12.0 | PW : 8.0 | Autonomy : 12.0 | Study : 4 | Project : 0.0 | Language : FR

## Objectives

Objectives of this course is to study the physicochemistry of electronic transfers at electrode/ electrolyte interfaces and concepts of electrochemical engineering. A large part of the course will be based on a concrete example of an industrial effluent treatment process. This course is mainly conducted in the form of problem-based learning, in group work, with individual evaluation at the end of the project.

Keywords : Butler-Volmer model, fuel cells, corrosion, electrolysis, battery

## Programme

This course will be presented in the form of a case study to address the following concepts:
1) Electrochemical thermodynamics: Spontaneous and non-spontaneous redox reactions. Maximum and minumum voltages for galvanic and electrolytic systems.
2) Electrochemical kinetics: Butler-Volmer model with and without transport limitations. Tafel plot analysis. Linear and cyclic voltammetry.
3) Transport / Fluidic: Diffusion, migration, and convection of electroactive species in different systems.
4) Electrochemical reactors: Architecture, characterization and scaling.

## Learning outcomes

- Differentiate between galvanic and electrolytic reactions.
- Determine electrochemical thermodynamic efficiency and voltage of a redox system.
- Determine key kinetic models used to characterize electrochemical devices.
- Design electrodes and operating conditions with favorable performance for specific applications.

## Independent study

Objectifs :

Méhodes :

## Core texts

Fabien MIOMANDRE, Saïd SADKI, Pierre AUDEBERT, *ÉLECTROCHIMIE DES CONCEPTS AUX APPLICATIONS*, Dunod, 2011
Hartmut WENDT, Gerhard KREYSA *GÉNIE ÉLECTROCHIMIQUE*, Dunod, 2001
François COEURET, Alain STORCK*ÉLÉMENTS DE GÉNIE ÉLECTROCHIMIQUE*, ParisTec et doc, 1993

## Assessment