# Challenges of modern chemistry

## In brief

**Course langage:** French

# Presentation

## Prerequisites

Fundamentals of organic and organometallic chemistry.

## Learning objectives

The growing interest for a more responsible chemical industry leads to the development of a chemistry commonly called "green chemistry".
In this course, we will focus on the 9th principle of green chemistry: catalysis and, in particular, homogeneous catalysis.

This theme will be adressed through an original approach of the chemical reaction.
The aim is to understand how a catalyzed reaction works in order to optimize it efficiently in a spirit of sustainable development.

**Learning objectives**:

- Understand how a catalyst works and its corollary, the catalyzed reaction..
- Identify the key parameters of a catalyzed reaction.
- Know how to optimize the parameters
- Implement a catalyzed reaction
- Write a scientific report

## Description of the programme

**Course content**:

- Introduction to organometallic chemistry (transition element chemistry).
- The basic steps of a catalytic reaction,

- Analysis and optimization of the parameters of a catalyzed reaction.
- Oxidations and reductions catalyzed by transition metals

**In tutorials**: studies of recent publications.

**Practical work**: implementation of catalyzed reactions.

## Generic central skills and knowledge targeted in the discipline

At the end of this course, in the field of transition metal catalyzed reactions, the participant should be able to:

-Analyze a mechanism in terms of elementary steps.
- Propose a reaction mechanism from the global scheme of the reaction.
- Implement a catalyzed reaction in a practical way.
- Study and understand a scientific article.
- Identify the important parameters of a reaction.
- Propose optimization solutions.
- Write a scientific report.

## How knowledge is tested

- A report on a recent original synthesis study.
- Reports of practical work.
- A final exam.

## Bibliography

- Crabtree, R. H. (2019). *The Organometallic Chemistry of the Transition Metals* (7e éd.). Wiley.

- Behr, A., & Vorholt, A. J. (2017). Homogeneous Catalysis with Renewables. Springer.
- Sheldon, R. A., Arends, I., & Hanefeld, U. (2007). Green Chemistry and Catalysis (1re éd.). Wiley-VCH.

## Teaching team

Laurent GIORDANO
Didier NUEL

## Sustainable Development Goal



Responsible consumption and production

| **Total des heures** | | **30h** |
|---|---|---|
| CM | Master class | 6h |
| TD | Directed work | 12h |
| TP | Practical work | 12h |

# Useful info

## Name responsible for EU

### Lead Instructor

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