UE 1.4 – Organometallics: From bonding to catalysis – 3 ECTS

Instructors’ names:
G. Prestat (coordinator), D. Over

Pedagogical objectives:
This transition-metal catalysis course in homogeneous phase allows students to acquire mastery of basic concepts of this field. Particular emphasis is placed on the understanding of reaction mechanisms and metal-ligand interactions in order to determine the optimal reaction conditions. Heck reactions, palladium-catalyzed cross-couplings and olefin metathesis are studied in depth.

Course pre-requisites:
Mastery of basic knowledge and concepts in inorganic and organic chemistry acquired L3 chemistry.

Program:
Coordination chemistry for organometallic catalysis
Elementary coordination chemistry: M-C and M-H bonds
Phosphine ligands, NHC carbene ligands
π Ligands: cyclopentadienyl, allyl, alkene, alkyne ...
Elementary steps in organometallic chemistry: oxidative addition and reductive elimination, insertion and disinsertion, electrophilic and nucleophilic attack ...
The general concept of catalysis and examples of the use of organometallic compounds in homogeneous catalysis: C-C couplings, Wacker process, olefin metathesis.

Organometallic catalysis
- Olefin metathesis
- Pd-catalyzed Allylic Alkylation

Acquired skills:
Mastery of metal-ligand σ and π interactions and elementary steps in organometallic chemistry. Understanding of basic organometallic catalysis concepts in homogeneous phase. Mastery of palladium-catalyzed couplings and olefin metathesis.

Evaluation:
Final written exam (100%).