

CH-707

Frontiers in Chemical Synthesis. Towards Sustainable Chemistry

Hu Xile, Waser Jérôme

Cursus	Sem.	Type
Chemistry and Chemical Engineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Multiple
Workload	60h
Hours	46
Lecture	10
Practical work	36
Number of positions	8

Frequency

Every 3 years

Remark

Next time: Spring 2026

Summary

This training will empowered the student with all the tools of modern chemistry, which will be highly useful for his potential career as a process or medicinal chemist in industry.

Content

Following topics will be at the focus of the lecture:

- The concepts of atom and step economy in synthesis
- Recent progresses in metal-catalyzed SP, SP2 and Sp3 C-C and C-X couplings
- The activation and direct functionalization of feedstocks compounds via C-H and C-C Activation
- The development of organocatalysis: towards metal-free catalysis
- Direct functionalization of olefins, including hydroamination, hydrogenation, hydrosilylation, hydroformylation and other C-C bond forming reactions
- The potential of radical chemistry for C-C and C-X bond formation
- Metal-Catalyzed Carbocyclization: From Ru and Rh-mediated cycloadditions to Pt and Au chemistry: the relative effect in organic chemistry.
- One-pot multi-steps reactions: avoiding time and ressource-consuming isolation procedures
- "New" technologies in the organic chemistry laboratory: microwave, ultrason, solid-phase synthesis, organic chemistry in water, parallel synthesis and reactions in flow reactors.

(General Concept of the Lecture Series: A thorough knowledge and understanding of chemical transformations is essential for the synthetic chemist. In this course series, the student will become familiar with the recent methodological developments in organic chemistry. With the tools of modern chemistry, they will be able to design new efficient, economical and environmentally friendly reactions and synthesis. Every student will be assigned a specific topic of research. He will be expected to make a thorough literature research on his subject, including pioneering works, state of the art and most recent developments. He will present his results to the class and the instructor and organize a short exercise session on the topic for the class. Towards Sustainable Chemistry: The development of efficient, atom and step economical processes is essential for the chemistry of the future.

Keywords

Organometallic Chemistry, Organic Chemistry, Catalysis, Synthesis Efficiency, Sustainable Chemistry

Learning Prerequisites

Recommended courses

Master EPFL or Equivalent

Resources

Moodle Link

- <https://go.epfl.ch/CH-707>