

CH-707

**Frontiers in Chemical Synthesis. Towards Sustainable Chemistry**

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Cursus	Sem.	Type
Chemistry and Chemical Engineering		Opt.

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

**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>