



NCCR  
**Catalysis**

# **Introduction to the Lecture Sustainable Chemistry and Engineering in Industry**

**September 10, 2025**



[nccr-catalysis.ch](https://nccr-catalysis.ch)



NCCR Catalysis

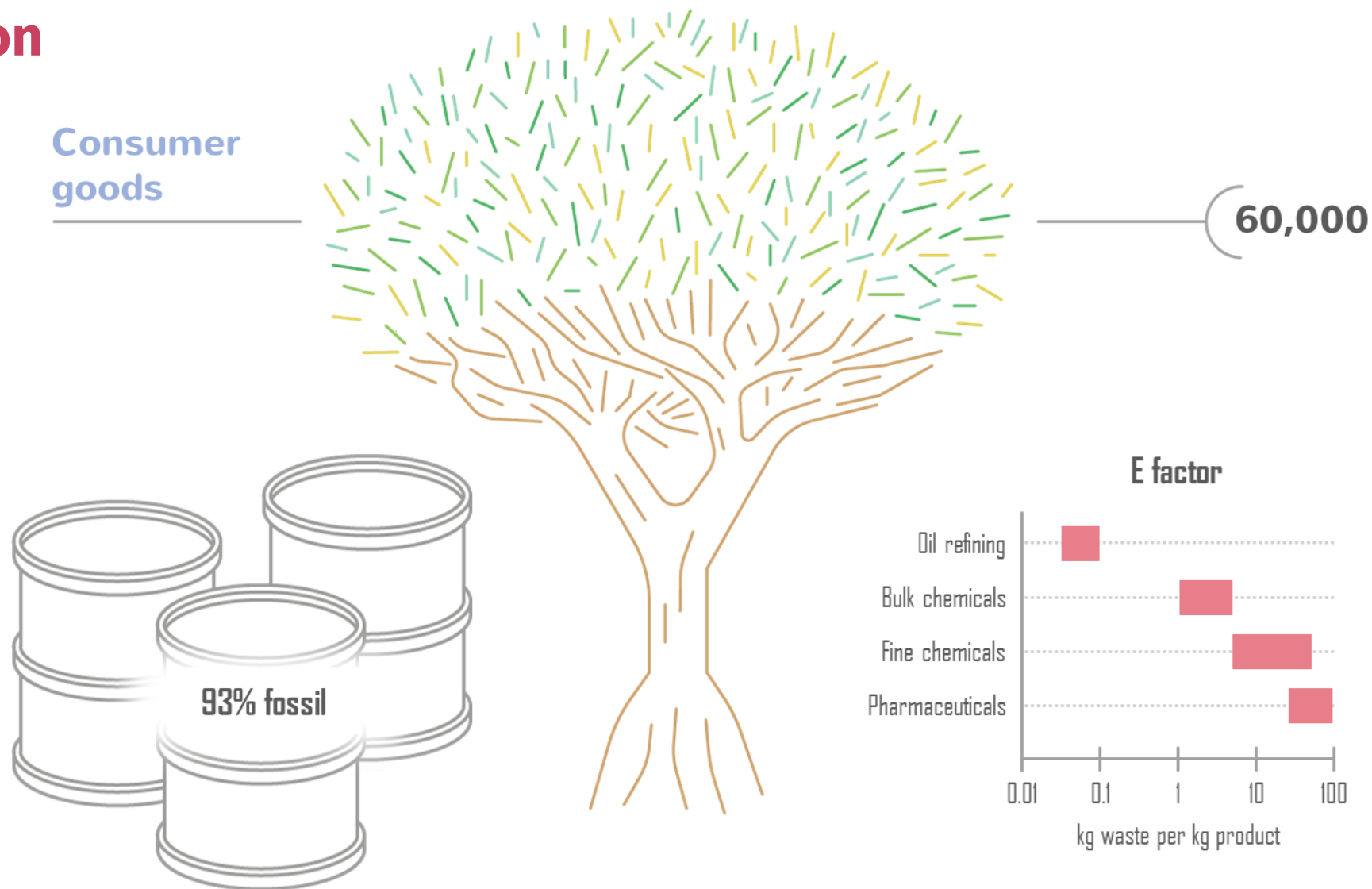


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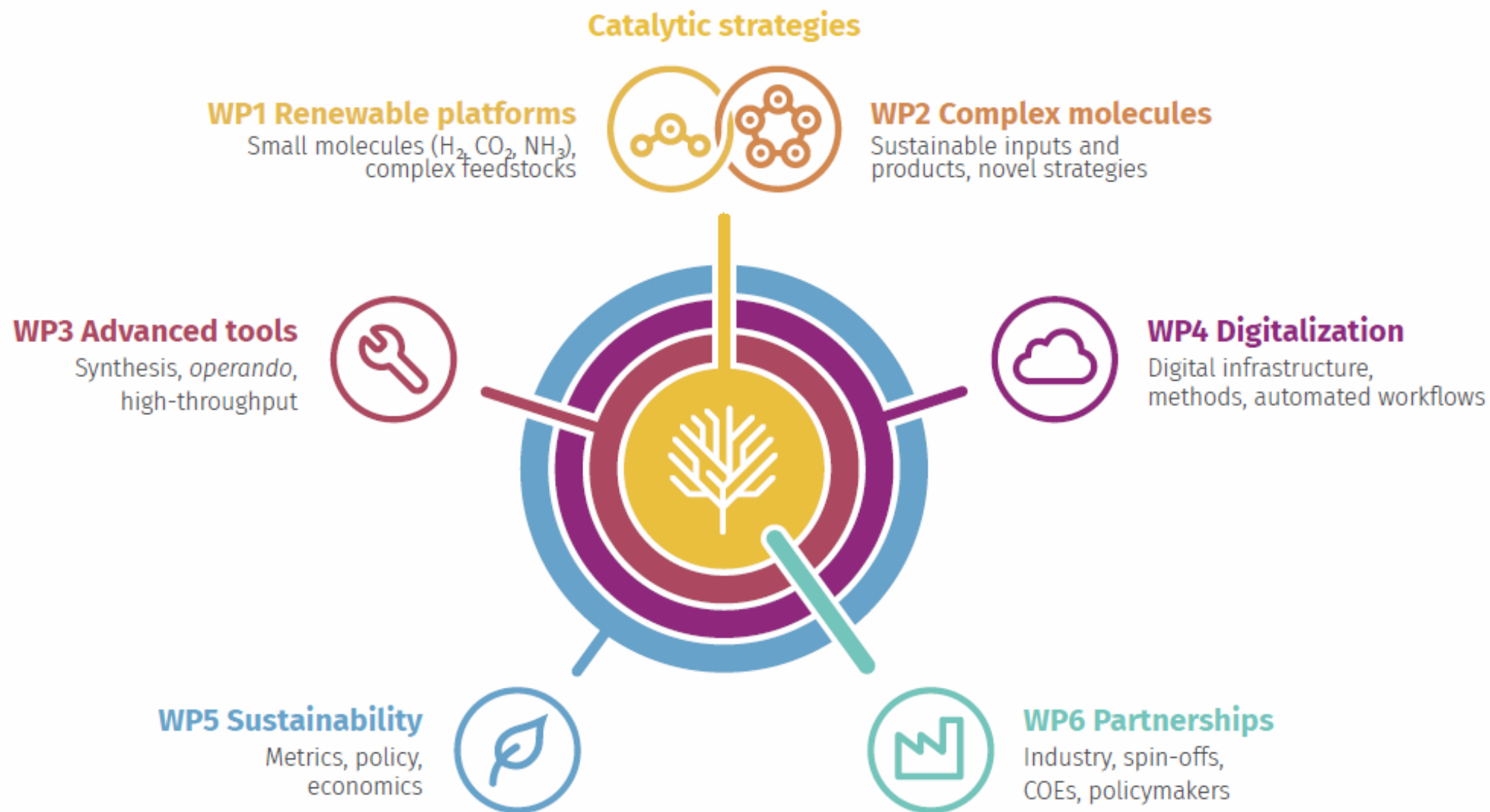
# Motivation



**A recent analysis showed that 99.4% of the most important chemicals are not produced in a sustainable way!**

*Green Chem.* **2021**, 23, 9881.

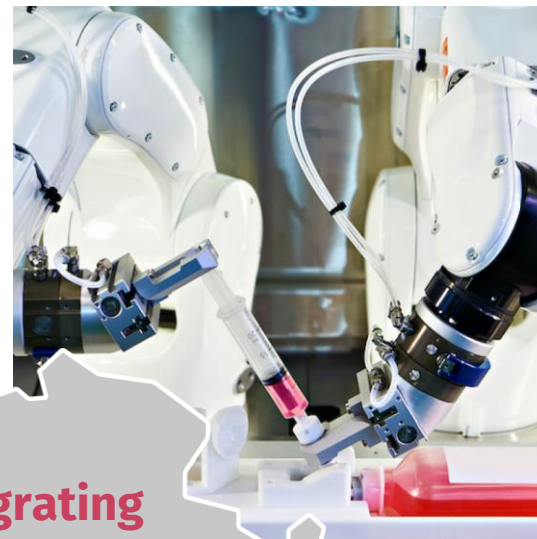
# Structure for Phase II



# Vision and Mission



**Structure  
Swiss research**



**Develop  
new technologies**

**Integrating  
catalysis science**

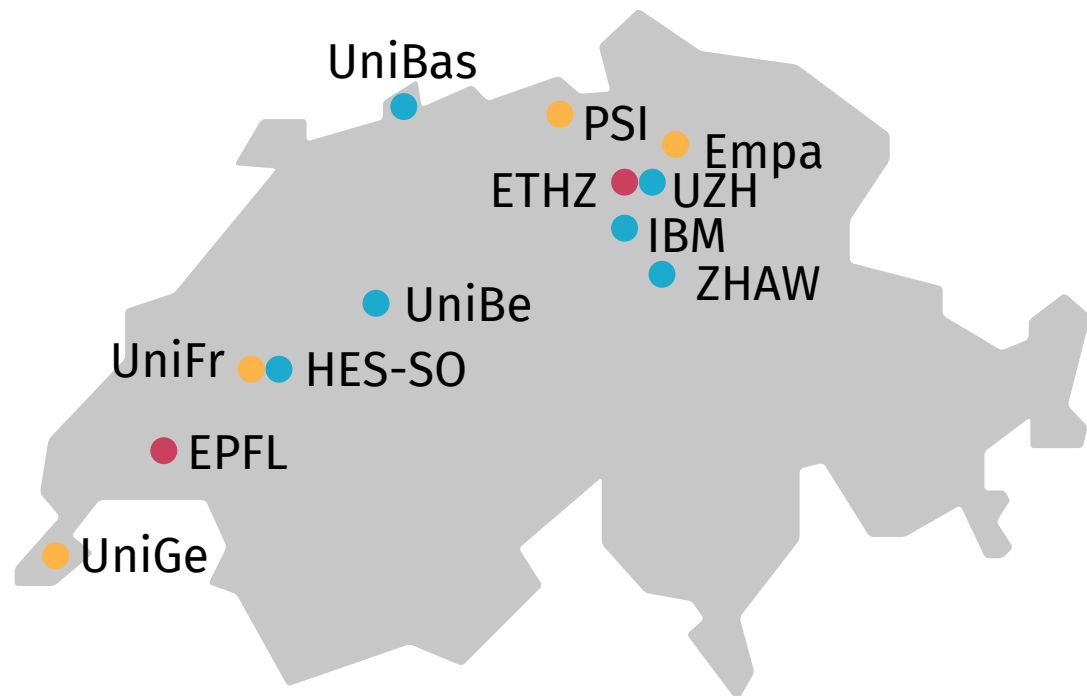
**Educate  
future leaders**



**Promote  
sustainable chemistry**

**Swiss headquarters for sustainable chemistry**

# Institutions



**13**  
Institutions

**46**  
PIs

**>200**  
Researchers

## Home institutions

**ETH zürich**      **EPFL**

## Core institutions

**Hes·so**  
 Haute Ecole Spécialisée de Suisse occidentale  
 Fachhochschule Westschweiz  
 University of Applied Sciences and Arts Western Switzerland

**IBM**


**University of Basel**  
Zürcher Hochschule für Angewandte Wissenschaften


**u<sup>b</sup>**  
b UNIVERSITÄT BERN


**University of Zurich** UZH

**zhaw**

## Associate institutions


**Empa**  
 Materials Science and Technology


**ICIQ**  
Institute of Chemical Research of Catalonia

**UNI FR**  
UNIVERSITÉ DE FRIBOURG  
UNIVERSITÄT FREIBURG

PAUL SCHERRER INSTITUT  



**UNIVERSITÉ DE GENÈVE**



# Master Specialization at SCGC

## Catalysis and Sustainable Chemistry /Chemical Engineering Master specialization



### Obligatory core lectures (14 ECTS (CH), 12 ECTS (CHE))

- Automated and Data-Driven Laboratories (New)
- Concepts and Tools for Sustainable Chemicals Manufacture (New)
- Sustainable Chemistry and Engineering in Industry (New)
- Project Ia (CH) or Chemical Engineering Lab&Project (CHE)

### Optional Courses (16 ECTS (CH), 18 ECTS (CHE))

- Core courses for catalysis (42 ECTS)
- Sustainability (36 ECTS)

***In addition, the NCCR will support the work of the SCGC of including more sustainability concepts in existing courses in the bachelor program (eg 12 concepts of green chemistry in BA2)***



# Sustainable Chemistry and Chemical Engineering in Industry

## Teachers

6 teachers coming from the Swiss Chemical industry (7x4 h sessions)

## Summary

In this lecture given by experts from the Swiss Chemical industry, the students will be introduced in key concepts of sustainable chemistry and chemical engineering of industrial relevance. They will be able to learn from real hands-on problems and to better understand the problems from the industry and work towards their resolution.

## Interactive lunch sponsored by NCCR Catalysis

8 students upon registration on moodle can interact with the teacher to discuss any topic or career related issue. Currently, participation to one chosen lunch is open. By the end of the week, participation to a second lunch will be opened.

## Evaluation

In Fall Semester, continuous evaluation, each module evaluated independently (exception: 2 “Robvieux” modules)

# Sustainable Chemistry and Engineering in Industry



10.09.2025: **Dr. Annik Nanchen**, TUV Süd: *Safety and Health and their importance for sustainability*

24.09.2025: **Dr. Cara Brocklehurst**, Novartis: *The proper choice of technology and their impact*

1.10.2025: **Dr. Fabrice Robvieux**, DSM-Firmenich: Green metrics: Real life tools

15.10.2025: **Dr. Fabrice Robvieux**, DSM-Firmenich : Case study from the fragrance industry

5.11.2025: **Dr. Edouard Godineau**, Syngenta: Case study from the agrochemical industry

3.12.2025: **Dr. Pierdomenico Biasi**, Casale SA: Case study from the bulk industry

17.12.2025: **Dr. Lucie Lovelle**, Novartis: Case study from the pharmaceutical industry



# Core Lectures for Catalysis

- CHE-403: Heterogenous Reaction Engineering (4 ECTS)
- CHE-407: Electrochemical Engineering (3 ECTS)
- CHE-437: Bioprocess and downstream processing (4 ECTS)
- CHE-438: Biotechnology Lab (4 ECTS)
- CHE-410: Catalysis for emission control and energy processes (3 ECTS)
- CH-410: Physical and chemical analyses of materials (3 ECTS)
- CH-417: Optical methods in chemistry (3 ECTS)
- CH-401: Advanced nuclear magnetic resonance (3 ECTS)
- CH-421: Catalysis for energy storage (3 ECTS)
- CH-422: Catalyst design for synthesis (2 ECTS)
- CH-435: Asymmetric catalysis for fine chemical synthesis (3 ECTS)
- CH-457: Artificial intelligence (AI) for chemistry (3 ECTS)
- PHYS-467: Machine learning for physicists (4 ECTS)



- CHE-408: Process intensification and green chemistry (3 ECTS)
- ENG-430: Risk management (2 ECTS)
- ENG-431: Safety of Chemical Processes (2 ECTS)
- ENV-370: Environmental system analysis and assessment (5 ECTS)
- ENV-471: Environmental economics (4 ECTS)
- ENV-507: Fate and behaviour of environmental contaminants (4 ECTS)
- ENV-410: Science of climate change (4 ECTS)
- MGT-495: Introduction to ethics and critical thinking (3 ECTS, limited)
- MSE-341: Sustainability and materials (3 ECTS)



# NCCR Catalysis Laboratories at EPFL

- Prof. Raffaella Buonsanti, nanocrystals for catalysis, <https://www.epfl.ch/labs/lnce/>
- Prof. Clemence Corminboeuf, computation/ML for catalysis, <https://www.epfl.ch/labs/lcmd/>
- Prof. Nicolai Cramer, homogenous asymmetric catalysis, <https://www.epfl.ch/labs/lcsa/>
- Prof. Paul Dyson, heterogenous catalysis, plastics recycling, <https://www.epfl.ch/labs/lcom/>
- Prof. Xile Hu, heterogenous and biocatalysis, <https://www.epfl.ch/labs/lsci/>
- Prof. Jeremy Luterbacher, biomass conversion, <https://www.epfl.ch/labs/lpdc/>
- **Prof. Suong Nguyen, catalytic sustainable polymer synthesis**, <https://www.suongnguyenlab.com/>
- Prof. Philippe Schwaller, digital chemistry, <https://schwallergroup.github.io/>
- Prof. Kevin Sivula, semiconductors for catalysis, <https://www.epfl.ch/labs/limno>
- Prof. Jerome Waser, catalysis for organic synthesis, <https://www.epfl.ch/labs/lcso/>
- Prof. Jieping Zhu, catalysis for natural product synthesis, <https://www.epfl.ch/labs/lspn/>



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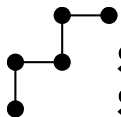


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# Thank you!

Contact for (not technical) questions about the NCCR or the specialization: [jerome.waser@epfl.ch](mailto:jerome.waser@epfl.ch)



**Swiss National  
Science Foundation**

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