

CH-480

Sustainable chemicals manufacture: concepts/tools

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Cursus	Sem.	Type
Chimiste	MA2, MA4	Obl.
Ing.-chim.	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Lecture	2 weekly
Practical work	2 weekly
Number of positions	

Summary

This course introduces tools to design and evaluate sustainable routes for chemicals and materials manufacture. You will understand approaches to process design and optimization, from the molecular to the planet level, and learn the fundamentals of sustainable chemistry.

Content

Sustainable chemistry embodies the design and efficient manufacture of chemicals from abundant and renewable raw materials using routes that minimize energy requirements, avoid damaging the environment and human health, and are economically viable. It is a powerful tool to help society achieve several of the Sustainable Development Goals identified by the United Nations.

Structure of the course:

- Introduction to green versus sustainable chemistry
- Sustainability dimensions and metrics
- Corporate sustainability, economics, and policy
- Renewable energy conversions
- Alternative carbon sources for chemicals
- Other resources including precious metals and solvents
- Chemistry of recycling
- Chemical fate and toxicological effects
- Industrial view

Each topic will be presented by a lecturer or guest speaker with relevant expertise.

Keywords

Sustainable Chemistry
Sustainability metrics
Alternative carbon sources
Recycling
Chemical manufacture

Learning Prerequisites**Required courses**

No special knowledge beyond the undergraduate curriculum in Chemistry or Chemical Engineering. Students wishing to attend the course from other backgrounds should contact the lecturers to discuss the fit.

Learning Outcomes

By the end of the course, the student must be able to:

- Integrate the fundamentals of sustainable chemistry in process design
- Assess / Evaluate sustainable routes for chemicals and materials manufacture
- Analyze approaches to process design and optimization, from the molecular to the planet level

Assessment methods

Session examination

The exam will account for 70% of the grade. The exercise will account for the remainder of the grade. Completion of the exercise is required to attend the exam.

Calculators are permitted

Resources

Bibliography

Klöpffer, W., Grahl, B. Life Cycle Assessment (LCA): A Guide to Best Practice, Wiley (2014)

Ressources en bibliothèque

- [Klöpffer, W., Grahl, B. Life Cycle Assessment \(LCA\): A Guide to Best Practice, Wiley \(2014\)](#)

Notes/Handbook

Course content based on slides

Moodle Link

- <https://go.epfl.ch/CH-480>