université PARIS-SACLAY | GRADUATE SCHOOL Chimie

Digital Micro-Certification
"The Challenges of Sustainable Chemistry"

January – February 2024

Project Managers

- Gwenaëlle **BOUJARD** : gwenaelle.boujard@universite-paris-saclay.fr
- Rachel **MEALLET** : rachel.meallet@universite-paris-saclay.fr
- Laurent **SALMON** : laurent.salmon@universite-paris-saclay.fr

The main goal

"To introduce the basics of sustainable development (SD) to chemistry students (master's level) and provide them with ideas for reducing the environmental impact of their research (doctoral level)

Two levels of digital certification:

- Level 1 certification: SD basics in chemistry (Master – 10.5 h) → 2023-2024
- Level 2 certification: chemistry research and SD (PhD – 10 h) → 2024-2025
  - prerequisite: obtaining Level 1
  - enter the online training catalog with points recognition (ED)

The interests

- Training program from the GS of Chemistry, established as part of UPSay's sustainable development policy
- ECS digital micro-certification ⇨ diploma valorization, CV
- ECS certification : ≠ greenwashing !
  - strong demand from chemistry students (+ C/EC...)
  - strong demand from our authorities (University, CNRS, HCERES, ANR...)
  - risk of students losing interest in chemistry if it remains inactive
  - although chemistry has reduced its impact on the environment in recent years, it needs to go further:
    - reduce consumption of energy and non-renewable (NR) raw materials
    - develop less stable and more specific molecules/materials
    - reduce waste production and move away from the linear economy
- we chemists have the "cards in our hands" to develop eco-responsible processes and produce these eco-compatible molecules/materials in the near future

The format

- 2023-2024: open to volunteer M1s, strongly recommended for M2s
- Compulsory for GS Paulze-Lavoisier laureates
- Mandatory registration at Master's level (M1 or M2)
- 7 successive Tuesdays from January 9, 2024 to February 17, 2024 (5:30pm-7pm)
- 3 sites: UPSay-Henri Moissan, UEVE, UVSQ
- Slides in English, speeches in English or French
- Attendance recommended for all registered students (including site students)
  - video recording available online for a limited time
- Level 1 assessment (e-Campus, end March 2024)
- 2024-2025: ECS micro-certification mandatory

Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

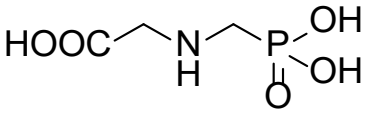
Module 3 : Chemical waste management and circular economy

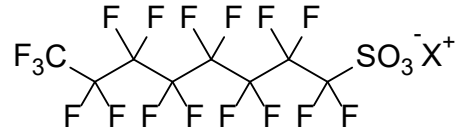
Module 4 : Renewable and bio-sourced chemistry

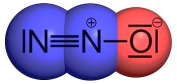
Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

L. SALMON (UPSay)
January 9, 2024 (Orsay)







Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

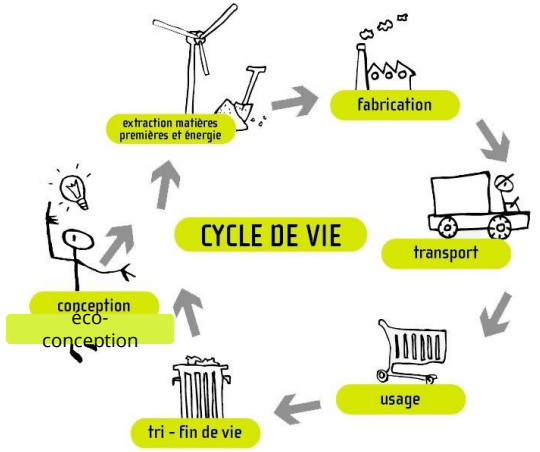
Module 3 : Chemical waste management and circular economy

Module 4 : Renewable and bio-sourced chemistry

Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

C. CANNIZZO (UEVE/CEA)
January 16, 2024 (Evry)



Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

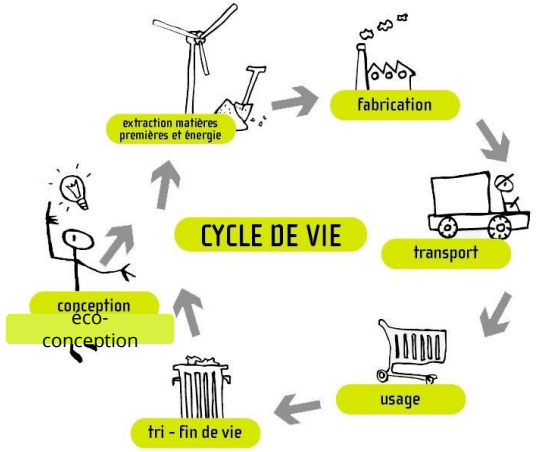
Module 3 : Chemical waste management and circular economy

Module 4 : Renewable and bio-sourced chemistry

Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

P. TARDIVEAU (UPSay)
January 23, 2024 (Versailles)



Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

Module 3 : Chemical waste management and circular economy

Module 4 : Renewable and bio-sourced chemistry

Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

S. HENRY-DAGUERRE
January 30, 2024 (Orsay)

SARPI VEOLIA

Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

Module 3 : Chemical waste management and circular economy

Module 4 : Renewable and bio-sourced chemistry

Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

M.-C. SCHERRMANN (UPSay)
February 6, 2024 (Evry)

Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

Module 3 : Chemical waste management and circular economy

Module 4 : Renewable and bio-sourced chemistry

Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

M. BOIVIN (UPSay)
February 13, 2024 (Versailles)

Pedagogical content

Certification level 1 : SD basics in chemistry (Master 10.5 h) → 2023-2024

Module 1 : Introduction to SD in chemistry

Module 2.1 : Lifecycle analysis (LCA/ACV) – Ecodesign

Module 2.2 : Lifecycle analysis (LCA/ACV) – Principles and Methodology

Module 3 : Chemical waste management and circular economy

Module 4 : Renewable and bio-sourced chemistry

Module 5 : Environmental regulations and chemical standards

Module 6 : Environmental performance assessment in chemistry

M.-C. SCHERRMANN (UPSay)
February 27, 2024 (Orsay)

$$\text{PMI} = \frac{\text{total mass in a process or process step}}{\text{mass of product}}$$

- process mass intensity
- atom saving
- environmental factor
- carbon footprint
- etc

95% of chemistry students at UPSay have never had such a global vision of sustainable chemistry during their training

Calendar

Date	Schedule	Place	Module	Module title	Speaker
January 9, 2024	17h30-19h	Henri Moissan *amphi O. Kahn*	Module 1	Introduction to SD in chemistry	L. SALMON (UPSay)
January 16, 2024	17h30-19h	UEVE *amphi'up*	Module 2.1	LCA/ACV-Ecodesign	C. CANNIZZO (UEVE/CEA)
January 23, 2024	17h30-19h	UVSQ *amphi Bertin*	Module 2.2	LCA/ACV-principles and methodology	P. TARDIVEAU (UPSay)
January 30, 2024	17h30-19h	Henri Moissan *amphi H. Daniel*	Module 3	Chemical waste management and circular economy	S. HENRY-DAGUERRE (VEOLIA)
February 6, 2024	17h30-19h	UEVE *amphi'up*	Module 4	Renewable and bio-sourced chemistry	M.-C. SCHERRMANN (UPSay)
February 13, 2024	17h30-19h	UVSQ *amphi Bertin*	Module 5	Environmental regulations and chemical standards	M. BOIVIN (UPSay)
February 27, 2024	17h30-19h	Henri Moissan *amphi H. Daniel*	Module 6	Environmental performance assessment in chemistry	M.-C. SCHERRMANN (UPSay)

Henri Moissan : amphi O. Kahn ou H. Daniel, bât.670, 17 av. des Sciences, 91400 Orsay
UEVE : amphi'up, bât. Maupertuis, 25 cours Monseigneur Romero, 91000 Evry-Courcouronnes
UVSQ : amphi Bertin, bât. Buffon, 45 av. des Etats-Unis, 78000 Versailles

Pedagogical content

Module 1: Introduction to sustainable development in chemistry (1.5 h - Laurent SALMON)

- Objectives of the certification
- Presentation of the modules of the certification:
  - Environmental aspects, LCA, eco-design, "green washing", renewable/bio-based chemistry
  - Waste and circular economy, standards/regulations in chemistry, environmental performance assessment
- Definition of sustainable development and its challenges for chemistry
- The place of chemistry in France and in the world (contributions, jobs, risks, responsibilities, challenges)
- Biogeochemical cycles and the main causes of chemical pollution (energy, industry, agriculture)
- Past and emerging pollutants (nanoparticles, µ-plastics, endocrine disruptors, air pollutants, PFAS)

Module 2 : Lifecycle analysis (2 x 1.5h – Caroline CANNIZZO and Pierre TARDIVEAU)

- 2-1. Great reflexes in eco-design, pollution transfers (false good ideas), global vision and LCA, principles of green chemistry, eco-products, eco-labels
- 2-2. Lifecycle analysis - Principles and Methodology

Module 3 : Chemical waste management and circular economy (1.5 h – S. HENRY-DAGUERRE)

- The Challenges of waste management in chemistry
- The principles of the circular economy and its application in chemistry
- Examples of waste reduction and circular economy projects in the chemical industry

Pedagogical content

Module 4 : Renewable and bio-sourced chemistry (1.5 h – M.-C. SCHERRMANN)

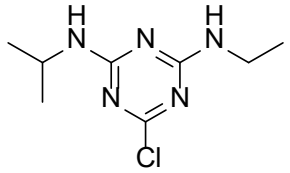
- Renewable and bio-sourced sources for chemistry
- The challenges of producing chemicals from renewable and bio-sourced sources
- Examples of research projects in renewable and bio-based chemistry
- Case study on the production of chemicals from bio-sourced sources

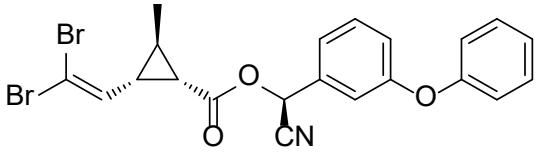
Module 5 : Environmental regulations and chemical standards (1.5 h – M. BOIVIN)

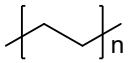
- Hierarchy of regulatory texts (Environmental Code, Labour Code, Public Health Code)
- Environmental standards (ISO 14001, 45001, 50001)
- REACH regulations (CLP, hazard pictograms…)
- Classified Installations for the Protection of the Environment (ICPE, declaration-registration-authorisation-SEVESO low/high threshold)
- Chemical risks (VME, VLE, VTR, LD50, etc) and chemical waste management

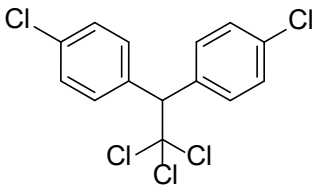
Module 6 : Environmental performance assessment and certification in chemistry (1.5 h – M.-C. SCHERRMANN)

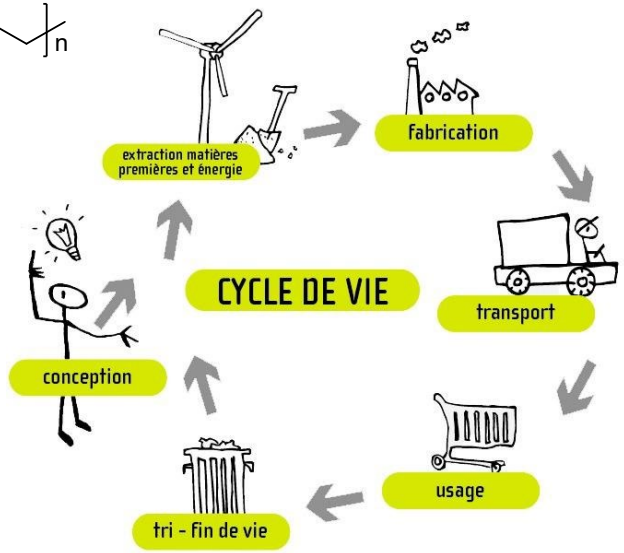
- Principles and Criteria for the Assessment of Environmental Performance in Chemistry
  - atom saving, environmental factor, carbon footprint, mass intensity process…
- Environmental certifications in chemistry
- Examples of the implementation of environmental performance assessment and certification in chemistry

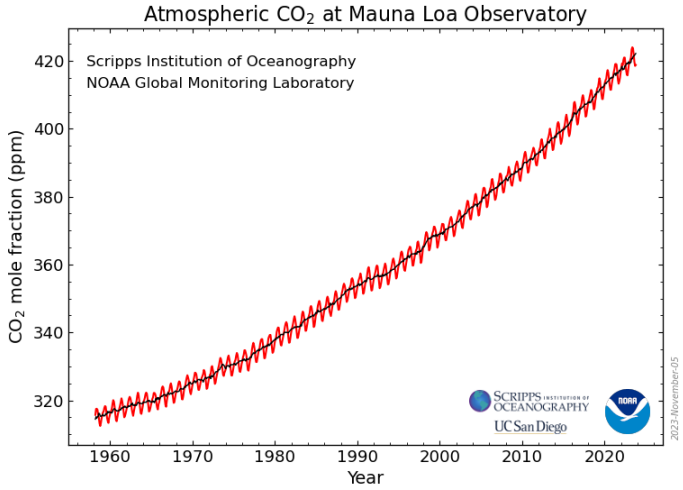


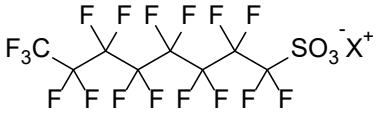


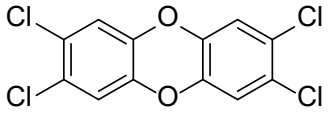


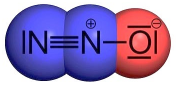


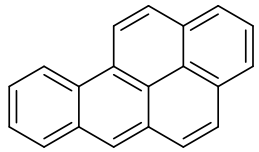


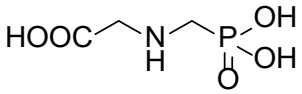












$$\mathrm{PMI} = \frac{\text{total mass in a process or process step}}{\text{mass of product}}$$

Thank you for your attention!