From Skin Science to Sustainable Cosmetic Formulation

Number of hours : 36h

CM	TD	TP
24h	8h	4h
Personal Work per teacher: 5h		

Teacher referent: **Ranesha Goorochurn**

Prerequisite

Show an interest for the cosmetic sector.
Profile with scientific or marketing training wishing to acquire knowledge on the biology of the skin, scalp and hair and the technical fundamentals of cosmetic product development.

General Objective

This program offers a comprehensive journey into sustainable cosmetic product development — from skin and scalp biology to responsible formulation practices.
It covers biological understanding, regulatory frameworks, and the use of artificial intelligence to support the transition to bio-based raw materials.
Through lectures, workshops, and collaborative projects, participants will gain hands-on experience in sustainable cosmetic innovation and the use of AI for formulation strategy.

Specific Objective and acquired competencies

The specific objectives are to

- Understand the skin and capillary biology, as well as their disorders.
- Propose key ingredients adapted to two specific skin needs in a relevant and justified manner.
- Correctly identify cosmetic products in the provided case studies based on the definition of the European Regulation
- Formulate solid product soap from raw materials understanding to experimental design
- Transmit generic knowledge on the global environmental impact of chemical industry, and specifically on cosmetics raw material production
- Design sustainable, safe, and efficient cosmetic formulations.
- Explore how AI can support sustainable formulation strategies (raw material sourcing, substitution, and analysis).

Summary and description of the course

Module 1: Skin physiology ½ day
Teacher: Ranesha Goorochurn

1. **Understanding the skin and its needs**

- The skin and its structure
- Skin territories
- Skin appendages
- Skin conditions

Module 2: Description and diagnosis of skin conditions ½ day
Teacher: Ranesha Goorochurn

2. **Skin conditions**
   - Dry zones
   - Oily zones
   - Imperfections or redness
   - Dilated pores
   - Loss of skin radiance
   - Pigment spots
   - Fine lines and wrinkles
   - Sagging skin

3. **Practical part**
   - Workshop in group of 3: from scientific to marketing concept

Module 3: Physiology of the scalp and hair ½ day
Teacher: Alexandre Guichard

1. **Anatomy and properties of the scalp**
   - Skin
   - Annexes
2. **The hair**
   - Structure
   - Physicochemical properties
   - Cycle of hair life
   - Ethnic specificities
   - Pigmentation

Module 4: Most common complaints and pathologies of the scalp and hair ½ day
Teacher: Alexandre Guichard
Description, diagnosis, pathophysiology, and treatments

1. **Hair and scalp types (dry and/or oily)**
   - Alopecia and hair loss
   - Dandruff (dry and oily)
   - Sensitive scalp and pruritus
   - Canitia (white hair)

Module 5: Regulation framework and requirements for cosmetic companies, focus on the EU legislation 1 day
Teacher: Ranesha Goorochurn

1. **Introduction**
   - French competent authorities and Sanctions
2. **Definition "Is it a cosmetic product?"**
   - according to European Regulations
   - quick case studies to illustrate the boundaries
3. **Key concept of European regulation (mini quiz)**
   - Responsible Person
   - Labelling
   - Claims
4. **Practical part**
   - Interactive workshop “Cross regulation”
   - Workshop in group “Could you solve if it is a cosmetic product?”

Module 6: Practical work Soap Formulation ½ day
Teacher : Elsa Pomès

1. **Practical part: Project development**

- Formulation of a batch of cosmetic products soap
  From the brief till the cosmetic product

Module 7: Use of AI in sustainable formulation strategy
Teacher : Robin Cisneros

Cosmetics and transition to bio-based raw materials : how AI can assist the sourcing of raw materials ½ day

1. **Chemical industry: from petrosourced to biobased raw materials**
   - A bit of history: basics of organic chemistry and its evolution through ages
   - The scientific challenges of transition to bio-based raw materials
   - Application to cosmetics: science, regulation and market strategy
2. **The use of AI models to help the transition to bio-based raw materials**
   - What are we searching for?
   - How to explain precisely what we want (prompting)?
   - How to verify the exactness of LLM answers?

TP: Practice of AI in transition from petrosourced to biobased raw materials ½ day

1. **Team spirit…**
   - Groups of 5, 1 formula per group
   - 3h to give a status of the given formula, propose alternatives for raw materials and criticize results obtained by AI
   - 1 Team : 1 document
2. **Technical work**
   - Chemistry understanding: what is the chemical structure and the role/properties of each ingredient
   - Formulation and market: what is the cost impact of a given raw material on the cost price of a formula
   - Prompt design / prompt strategy: design one big prompt with all the elements? Or prepare a prompting sequence?

3. **AI based research exploitation**
   - AI answering quality analysis
   - Criticism of Prompting strategy
   - Proposition for a probably viable bio-based alternative formulation from the initial chosen one

Sustainable Development and Corporate Social Responsibility

The sustainable developments applied to cosmetic science is also to stop to formulate with petrosourced raw materials and switch to biobased ones. But this poses specific challenges, related to chemical / physico-chemical properties, price, etc. LLM are powerful tools to assist this evolution but need to be used wisely and carefully, otherwise what was intended to reduce time to market of R&D will turn into something resource consuming.

The global lesson is constructed to foster team spirit and cooperation rather than competition and self-centred work. Building team spirit, with mutual respect and assistance to other is necessary in a CSR development of a company.

Evaluation

- Individual evaluation: Presence, participation, team spirit and mutual assistance (asking for help and giving some)
- Group evaluation: Final report of the TP (data processing, optimization, interpretation and conclusions)