Module title	**Sustainable & Green Chemistry**
Code	CBP1
Degree Programme	Master of Science in Life Sciences
Group	Chemistry
Workload	4 ECTS (120 student working hours)
Module Coordinator	**Name:** Dr. Roger Marti **Phone:** +41 26 429 6703 **Email:** roger.marti@hefr.ch **Address:** HEIA-FR, Chemistry Department, Bd. Pérolles 80, 1700 Fribourg
Lecturers	Professor from the UNITA Network: • Prof. Dr. Manfred Zinn (HES-SO Valais/Wallis) • Prof. Roger Marti (Haute école d'ingénierie et d'architecture de Fribourg) • Prof. Ivano Alessandri (University of Brescia, Italy) • Prof. Elza Bontempi (University of Brescia, Italy) • Prof. Pierre Oueadraogo (Université Savoie Mont Blanc) • Prof. Carole Charbuillet (ENSAM, Le Bourget du Lac) • Prof. Jean-Marc Leveque (Université Savoie Mont Blanc) • Prof. Giorgio Grillo (University of Torino, Italy) • Prof. Emanuela Calcio Gaudino (University of Torino, Italy) • Prof. Maela Manzoli (University of Torino, Italy) • Prof. Silvia Tabasso (University of Torino, Italy) • Prof. Laurent Duclaux (Université Savoie Mont Blanc) • Prof. Maria Covei (University of Brasov, Romania) • Prof. Patricia Ferreira Neila (University of Zaragoza, Spain)
Entry requirements	Chemistry or Biotechnology at Bachelor of science level
Learning outcomes and competences	This program equips participants with the knowledge and practical skills to apply green chemistry principles and circular economy concepts in sustainable chemical processes. Through lectures, workshops, and case studies, participants will gain competencies in innovative technologies and collaborative problem-solving. **By the end of the program, participants will be able to:** • **Apply Green Chemistry Principles** Transform biomass into value-added products using sustainable methods. • **Integrate Circular Economy and LCA** Design processes with circularity and environmental impact in mind. • **Use Advanced Techniques and Technologies** Employ photochemistry, biocatalysis, and AI for innovative solutions. • **Implement Practical Solutions** Conduct hands-on experiments and case studies in green chemistry. • **Collaborate and Communicate** Present findings and work effectively in multidisciplinary teams.
Module contents	- From Wood to Plastics – Valorization of Hemicellulosic Biomass - Tailor-made Polyhydroxyalkanoates: A Class of Biopolymers with Unique Properties - Waste-Based Materials for Technology or Use of Photochemistry for Promoting Sustainable Reactions

	- The Circular Economy during the Energy Transition - Introduction to Circular Economy - Life Cycle Assessment and Circularity (Example of Polymers) - AI and Green Chemistry - Advances in Green Extraction: Toward Sustainable Recovery of Natural Products - Green Chemistry Meets Cavitation Technology: Sustainable Routes for Biomass Valorization and Water Remediation (From Lab to Pilot Scale) - From Biomass to Value-Added Products: Heterogeneous Catalysts and Enabling Technologies at Work - Closing the Loop: Green Solvents from Biomass for Biomass Valorization - Methods of Green Chemistry in Carbon Material Preparation - Advanced Wastewater Treatment through Photocatalysis - Green Chemistry and Biocatalysis
Teaching / learning methods	• Basic concepts and theoretical backgrounds by lecturers • Inputs by guest lecturers from industry and academia • Exercises and analysis of case studies • Lab visits with hands-on demonstration
Assessment of learning outcome	1. Exam 2. Poster sessions and case studies Remediation is not possible for this module.
Format	Summer school - 29 June to 3 July 2026 at University Savoie Mont Blanc - 6 and 7 July 2026 online
Timing of the module	Spring semester, CW 27
Venue	On-site lectures at University Savoie Mont Blanc and online
Bibliography	Lectures notes (PDF) and additional material (exercises) will be delivered in addition before and during the module.
Language	English
Links to other modules	**Coordination with modules:** • C4, Green Chemistry • C3, Polymer & Applications
Comments	There is a participant limit in this module. Registrations will be considered based CV, letter of motivation and commitment to present a poster
Last Update	4.12.2025, Roger Marti