Title of BIP: GREEN CHEMISTRY UNITA SUMMER SCHOOL

General information

Objectives and Description:

Today, sustainable chemistry is booming in order to support the transition to a more climate-friendly, energy-efficient and environmentally-friendly economy, combat pollution and integrate into a circular economy. This Blended Intensive Programme (BIP) will explore innovative green chemistry processes and practices, proposing a range of scientific educational activities in this area.

The objectives of this school are:

1/ to impart scientific knowledge on new methods or innovative processes in green chemistry,

2/ to introduce students to the impacts of the energy transition, the implementation of the circular economy and new practices (e.g. artificial intelligence, process decarbonisation, life cycle analysis and circularity) in the field of green chemistry,

3/ to raise participants' awareness of industrial and economic issues in the field of green chemistry

4/ to develop skills in the field of green chemistry through workshops, practical work and projects

5/ to present and discuss work in green chemistry to a scientific audience (poster presentations, oral presentations, etc.).

This summer school on the theme of GREEN CHEMISTRY, organised as part of the UNITA alliance, will be held in two parts. Teaching will be delivered remotely (five online sessions between 10 June and 24 June) and in person (from 29 June to 3 July) at the Bourget du Lac site**.** The target number of students participating in is from 20 to 30.

Teaching on various thematic aspects of green chemistry will take the form of lectures, workshops, practical work, participatory group projects, round tables, poster sessions and site visits.

The topics explored will be:

- Circular economy and life cycle analysis
- Heterogeneous catalysis, photocatalysis and enzymatic catalysis processes
- Biomass recovery, extraction, cavitation processes, green solvents
- Recyclability and sustainability of materials; green biopolymers; bio-based materials
- Green chemistry and artificial intelligence
- Water treatment
- Practical work in green chemistry

Methods and outcomes:

This summer school on the theme of GREEN CHEMISTRY will feature lectures (in person and online) delivered by teachers/researchers who are specialists in the field of green chemistry. Participatory workshops, practical work, mini-projects and case studies, meetings/round tables with industry representatives, and visits to sites and start-ups in the field will also raise students' awareness of issues in the business world.

Students will present their research activity or a project in green chemistry and the circular economy of various kinds (economic, scientific, ecological) during a poster session to an audience of experienced researchers. Prizes will be awarded for the best presentations. A round table discussion will be organised, bringing together industrialists, start-up leaders and students to discuss the environmental transition, its obstacles and the future of green chemistry in the circular economy.

A cultural and team-building activity will be offered to participants during their in-person stay.

Field of Education:

Sustainable chemistry, Organic chemistry, Materials chemistry, Catalysis, Circular economy, Life cycle analysis

Target audience / Participants profile:

Master's students of chemistry (1st or 2nd level) and PhD students specialising in various areas of chemistry.

No of ECTS issued:

4 ECTS

Language of instruction and requirements:

English language

Dates for physical activity:

Five days from 29th June to 3rd July

Location of physical activity:

Université Savoie Mont Blanc, Le Bourget du lac

Dates for virtual component:

Five sessions between 10th June and 24th June

Virtual Component Description:

Kickoff sessions and four on-line conferences with some quiz

Organizing Board

Receiving/Host university:

University Savoie Mont Blanc (USMB), France (Prof. Laurent DUCLAUX, laurent.duclaux@univ-smb.fr)

Sending/Partner universities:

P1. University of Torino (UNITO), Italy (Prof. MANZOLI Maela, maela.manzoli@unito.it)

P2. University of Brescia (UNIBS), Italy (Prof. MANNU Alberto, alberto.mannu@unibs.it)

P3. HES-SO Haute école d'ingénierie et d'architecture de Fribourg, Switzerland (Prof. MARTI Roger, roger.marti@hefr.ch)

P4. HES-SO Valais-Wallis - Haute Ecole d'Ingénierie, Switzerland (Prof. ZINN Manfred, manfred.zinn@hevs.ch)

P5. University of Brasov (UNITBV), Romania Switzerland (Prof. COVEI Maria, maria.covei@unitbv.ro)

P6. University of Zaragoza (UNIZAR), Spain Romania Switzerland (Prof. FERREIRA NEILA Patricia, ferreira@unizar.es)

Detailed programme

1. Planned activities during virtual component:

All the times are Central European Summer Time (CEST)

1st session: Wednesday 10th June

5:00-6:00 pm Kickoff meeting (program presentation, instructions for posters and poster session), Laurent Duclaux and other teachers

2nd session: Tuesday 16th June

5:00-6:00 pm Lecture on-line: The circular economy during the energy transition, Bontempi Elza (Univ. Of Brescia)
6:00-6:15 pm Quiz on the lecture
6:15-7:15 pm Lecture on-line: Hazard analysis in black mass industrial processing, Alberto Mannu (Univ. Of Brescia)
7:15-7:30 pm Quiz on the lecture

3rd session: Thursday 18th June

5:00-6:00 pm Lecture/Conference on-line
Advanced wastewater treatment through photocatalysis part 1 Maria Covei (Univ. of Brasov)
6:00-6:15 pm Quiz on the lecture
6:15-7:15 pm Lecture/Conference on-line
Advanced wastewater treatment through photocatalysis part 2 Maria Covei (Univ. of Brasov)
7:15-7:30 pm Quiz on the lecture

4th session: Tuesday 23rd June

5:00-6:00 pm Lecture/Conference on-line
Green Chemistry and Biocatalysis part 1, Patricia Ferreira (UNIZAR, University of Zaragoza)
6:00-6:15 pm Quiz on the lecture
6:15-7:15 pm Lecture/Conference on-line
Green Chemistry and Biocatalysis part 2, Patricia Ferreira (UNIZAR, University of Zaragoza)
7:15-7:30 pm Quiz on the lecture

5th session: Wednesday 24th June

5:00-6:00 pm Green chemistry methods in carbon material elaboration, Laurent Duclaux
6:00-6:15 pm Quiz on the lecture
6:15-7:00 pm 2nd Kickoff meeting (presentation of working group, exchange on abstract and posters posters, various questions, etc.), Laurent Duclaux and other teachers

2. Planned activities during physical component:

1st day: Monday 29th June

9:00-10:15 am Welcoming participants, Presentation of UNITA and Presentation of the school
10:30-12:30 pm Lecture: From Wood to Plastic's – Valorization of Hemicellulosic Biomas, Roger Marti (HES-SO)
12:30-2:00 pm Lunch
2:00-4:00 pm Lecture: Waste Based Materials for technology, Ivano Alessandri (Univ. Of Brescia)
4:15-5:15 pm Presentation of team mini-project, Bernard David (USMB)/ J.M. Lévêque (USMB)
5:30 -6:45 pm Round Table (chairmen: J.M. Lévêque, USMB, B. David)
6:45- 8:15 pm Cocktail reception

2nd day: Tuesday 30th June

9:00-10:00 am Introduction to circular economy, Pierre Oueadraogo (Univ. Savoie Mont Blanc)
10:15-12:15 pm Lecture/worshop: Life Cycle Assesment and Circularity (example of polymers), Carole Charbuillet (EN-SAM, Le Bourget du Lac)
12:15-1:30 pm Lunch
1:30-3:00 pm Team work on project
3:15-6:15 pm Visit of industrial sites (Centre de tri, Trialp, Nantet, Plateforme compostage) Gregory Chatel (USMB)

3rd day: Wednesday 1st July

8:15-10:15 am Lecture: Advances in green extraction: toward sustainable recovery of natural products, Giorgio Grillo (Univ. of Torino, Italy)

10:30-12:30 pm Lecture: Green chemistry meets cavitation technology: sustainable routes for biomass valorization and water remediation (from lab to pilot scale), Emanuela Calcio Gaudino (Univ. of Torino)
12:30-3:00 pm Poster student sessions / Lunch (Buffet), Vote on posters
3:00-6:00 pm Cultural tour

4th day: Thursday 2nd July

8:15-10:15 am Lecture: From biomass to value-added products: heterogeneous catalysts and enabling technologies at work, Maela Manzoli (Univ. of Torino)
10:30-12:30 pm Workshop IA and Green Chemistry, Jean -Marc Leveque (USMB)
12:30-2:00 pm Lunch
2:00-4:00 pm Lecture: Closing the loop: green solvents from biomass for biomass valorization, Silvia Tabasso (Univ. of Torino)
4:15-6:15 pm Team work on project

5th day: Friday 3rd July

8:00-10:00 am Lecture: Tailor-made Polyhydroxyalkanoates: A Class of Biopolymers with Unique Properties, Manfred Zinn (HES-SO)
10:15-11:45 pm Team work on project
11:45-1:30 pm Lunch
1:30-3:30 pm Practicals of green chemistry, L. Reinert/ L. Duclaux/ N. Kardos/ A. Aissat/ B. David/ J.M. Lévêque (USMB)
3:45-6:45 pm Evaluation of the mini-projects / Oral presentation
8:00-11:30 pm Banquet / Award of poster / Animation

Application procedure

How: Students will apply for an Eramus+ short term mobility at their home university.
Home University will send the list of selected participants to USMB, **with their CV and motivation letter**.

Required documents for the application
- Short Curriculum Vitae and a covering letter showing your interest and especially addressing your interest in green chemistry and motivation to participate to the summer school
In the event of high demand for participation, we reserve the right to request grades and rankings from the last academic year.
The selected candidates can be interviewed by videoconference.

What is covered by host university:

- All the delivered conferences, lectures, workshop, practical work and various teaching sessions are free of charge
- Visit of sites of interest (company)
- One cocktail
- A poster session buffet
- One banquet
- A cultural and team-building activity will be offered to participants during their in-person stay
- A session of practical experiment in green chemistry