BLENDING INTENSIVE PROGRAMME (BIP)

Biological Carbon Capture Technologies

BIP PROGRAM

This course is providing an interdisciplinary overview (microbiology, process engineering, modelling) about biotechnologies for carbon capture and its possible applications. These concepts will be comprehensively presented and discussed in this BIP course in order to set the new horizon for a carbon neutral circular carbon economy.

DATE & PLACE

In person: 13th to 17th July 2026
Online: 20th to 23rd July 2026

University of Valladolid
Valladolid, Spain

AIMED AT

Researchers and **PhD students** enrolled in a PhD program focused on Chemical or Environmental Engineering, Biotechnology, Environmental Sciences, Chemistry, Industrial Production or similar at their home institutions. Maximum 25 people

REGISTRATION

Deadline: June 7th, 2026

COURSE FEE

BIP participants	Free of charge
Participants without grant	180€

REGISTRATION FORM

https://bioccapture.blogs.uva.es/ | **Contact**: mariarosario.rodero@uva.es

Co-funded by the Erasmus+ Programme of the European Union

BIP Program

PHYSICAL COMPONENT

Day 1 | Monday 13, July 2026

- 9:00-9:10 | Registration
- 9:10-9:30 | Welcome and course introduction
  - Mª del Rosario Rodero/Octavio García (organizing committee)/Pedro A. Encina (Head of the Institute of Sustainable Processes, ISP)/José Ramón González (Director of the Doctorate School). Welcome to the Biological Carbon Capture Technologies Course and presentation of the ISP.

Module 1. Organic carbon capture and bioconversion via anaerobic non-phototrophic processes

- 9:15-11:00 | Mª del Rosario Rodero Raya (Institute of Sustainable Processes, UVa). *Biogas production and biological technologies for biogas upgrading*
- 11:00-11:30 | Coffee break
- 11:30-12:30 | Mª del Rosario Rodero Raya (Institute of Sustainable Processes, UVa). *Rethinking biogas: innovative applications in biorefineries*
- 12:30-13:30 | José de Jesús Montoya Rosales (Institute of Sustainable Processes, UVa). *Biohydrogen production via dark fermentation*
- 13:30-15:00 1 Lunch
- 15:00-17:00 | Alice Lanfranchi (Ghent University). *Bioprocess coupling with dark fermentation*
- 17:00-18:00 | Technical visit to the laboratories of the Institute of Sustainable Processes

Day 2 | Tuesday, 14 July 2026

- 9:00-10:00 | Alice Lanfranchi (Ghent University). *EU regulation and technology transfer in biological carbon capture*

Module 2. Photosynthetic bioprocesses for carbon capture and recycling

- 10:00-11:00 | Luis Diaz Allegue (Department of Bioscience Engineering, University of Antwerp). *Introduction to Purple Phototrophic Bacteria (PPB)*
- 11:00-11:30 | Coffee break
- 11:30-12:30 | Luis Diaz Allegue (Department of Bioscience Engineering, University of Antwerp). *Purple Phototrophic bacteria and resource recovery: why are they interesting?*
- 12:30-13:30 | Visit to the Historic Library of the University of Valladolid
- 13:30-15:00 | Lunch
- 15:00-17:00 | Luis Diaz Allegue (Department of Bioscience Engineering, University of Antwerp). **Workshop 1**: *Fundamentals of mechanistic modelling of bioprocesses based on Purple Phototrophic bacteria*

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PHYSICAL COMPONENT

Day 3 | Wednesday 15 July 2026

Module 2. Photosynthetic bioprocesses for carbon capture and recycling

- 9:00-10:00 | Luis Diaz Allegue (Department of Bioscience Engineering, University of Antwerp). *Designing purple biorefineries: Integrating PPB into circular processes*
- 10:00-11:00 | Luis Diaz Allegue (Department of Bioscience Engineering, University of Antwerp). *Purple cleantech for food and feed: Protein and pigment production*
- 11:00-11:30 | Coffee break
- 11:30-12:30 | Simone Krings (Institute of Sustainable Processes, UVa). *Carbon capture in oxygenic photosynthetic microorganisms*
- 12:30-13:30 | Laura Vargas Estrada (Institute of Sustainable Processes, UVa). *Boosting microalgae biotechnology via nanoparticle addition*
- 13:30-15:00 | Lunch
- 15:00-17:00 | **Workshop 2**: *Development and implementation of a model for enriched purple phototrophic bacteria for PHA production*

Day 4 | Thursday 16 July 2026

Module 3. The Carboxylate Platform: from waste carbon to bioproducts

- 9:00-10:00 | Octavio García Depraect (Institute of Sustainable Processes, UVa). *Microbial recycling of bioplastics into carboxylates via mixed-culture fermentation*
- 10:00-11:00 | Marcela Levío Raimán (Institute of Sustainable Processes, UVa). *Carboxylates as a novel carbon source for lipid and protein production in a lichen-like system*
- 11:00-11:30 | Coffee break
- 11:30-13:30 | Alice Lanfranchi (Ghent University). *The carboxylate platform: anaerobic fermentation for the production of chemicals, plastics and materials*
- 13:30-15:00 | Lunch

Module 4. Anaerobic microbial cultivation for conversion of C1 substrates

- 15:00-16:00 | Alice Lanfranchi (Ghent University). *Acetogens: alternative C1 feedstocks and mixotrophy*
- 16:00-17:00 | Andrés Felipe Torres Franco (Institute of Sustainable Processes, UVa). *Gas-liquid mass transfer in biocarbon technologies: fundamentals, challenges and opportunities*

Day 5 | Friday 17 July 2026

Module 5. Analysis of microbial communities in carbon conversion systems

- 9:00-11:00 | José de Jesús Montoya Rosales (Institute of Sustainable Processes, UVa). **Workshop 3**: *Using DADA2 in R to Build Reproducible Microbial Community Analysis Workflows in Biological Carbon Conversion systems*

PHYSICAL COMPONENT

- 11:00-11:30 | Coffee break
- 11:30-13:00 | José de Jesús Montoya Rosales (Institute of Sustainable Processes, UVa). **Workshop 3**: *Using DADA2 in R to Build Reproducible Microbial Community Analysis Workflows in Biological Carbon Conversion systems*
- 13:00-14:30 | Lunch
- 14:30-16:30 | Project preparation by students. Instructors: Alice Lanfranchi (Ghent University) and María del Rosario Rodero Raya (Institute of Sustainable Processes, UVa)
- 16:30-17:00 | Coffee break
- 17:00-17:30 | Mª del Rosario Rodero Raya /Octavio García Depraect (Institute of Sustainable Processes, UVa). Questionnaire and course closure.

BIP Program

ONLINE COMPONENT (20-23 July 2026)

Day 1 | Monday 20 July 2026

Module 1. Organic carbon capture and bioconversion via anaerobic non-phototrophic processes

- 9:00-10:00 | Andrea Turolla (Politecnico di Milano). *Biological carbon sequestration from waste streams*

Module 2. Photosynthetic bioprocesses for carbon capture and recycling

- 10:00-11:00 | Elena Ficara (Politecnico di Milano). *Microalgae-based bioremediation*
- 11:00-11:15 | Break
- 11:15-12:15 | Giuseppina Oliva (University of Salerno). *Biorefinery perspectives for the valorization of microalgae biomass with circular economy approach*

Module 4. Anaerobic microbial cultivation for conversion of C1 substrates

- 12:15-13:15 | Ioannis Vyrides (Cyprus University of Technology). *Iron-Driven Bioconversion: Turning CO2 into methane and acetic acid with metallic iron and anaerobic microbes*

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ONLINE COMPONENT

Day 2 | Tuesday 21 July 2026

Module 5. Microbial protein production coupled to carbon capture

- 9:00-10:00 | Myrsini Sakarika (Ghent University). *Coupling microbial protein production to carbon capture and utilization*
- 10:00-11:00 | Silvio Matassa (Università degli Studi di Napoli «Federico II"). *From waste to protein through gas-based mixed microbial culture fermentation*
- 11:00-11:15 Break

Module 6. Microbial electrochemical technologies for resource recovery from gaseous and liquid waste streams

- 11:15-12:15 | María Fernanda Pérez Bernal (Laboratoire de Biotechnologie de l'Environnement, INRAE). Microbial electrochemical technologies: main anodic and cathodic based processes for resource recovery
- 12:15-13:15 | Meritxell Romans Casas (Universitat de Girona). Steering microbial electrosynthesis towards the production of carboxylates

Day 3 | Wednesday 22 July 2026

- 9:00-10:00 | Ángel Estevez Alonso (Ghent University). *Low pH fermentations as key environments in the transition toward a sustainable circular economy*

Module 7. Techno-economic analysis of bioprocesses

- 10:00-12:00 | María Molinos Senante (Institute of Sustainable Processes, UVa). *Techno-economic analysis of bioprocesses for resource recovery*

Day 4 | Thursday 23 July 2026

9:00-11:00 | Student presentations and course closure

PARTICIPATING INSTITUTIONS

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