

Biological Carbon Capture Technologies

Physical component

Monday 12th June 2023

8:30-9:00 Arrival and registration

9:00-9:10 Welcome and introduction

M^a del Rosario Rodero/Raúl Muñoz (organizing committee)/Pedro A. Encina (Head of the Institute of Sustainable Processes)/ José Ramón González (Director of the Doctorate School). Welcome to the Biological Carbon Capture Technologies Course and presentation of the Institute of Sustainable Processes

MODULE 1. MICROBIOLOGY TOOLS

9:10-11:00 Sara Cantera (Institute of Sustainable Processes, UVa). Microbial Ecology in the Era of NGS

11:00-11:30 Coffee break

11:30-12:30 Sara Cantera (Institute of Sustainable Processes, UVa). Multiomics from gen to functionality

12:30-13:30 Sara Cantera (Institute of Sustainable Processes, UVa). Questions & Applications of molecular biology on your own systems

13:30-15:00 Lunch

MODULE 2. ANAEROBIC MICROBIAL CULTIVATION AND CATALYSIS FOR CONVERSION OF C1 SUBSTRATES

15:00-16:00 Martijn Diender (Wageningen University & Research). Microbial physiology of different types of C1 metabolism and their applications

16:00-17:00 Martijn Diender (Wageningen University & Research). Redox and energy metabolism of C1 conversion and their importance in designing biotechnological processes

17:00-17:30 Coffee break

17:30-18:30 Martijn Diender (Wageningen University & Research). Case of study of anaerobic conversion of C1 substrates



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Technology



Tuesday 13th June 2023

MODULE 2. ANAEROBIC MICROBIAL CULTIVATION AND CATALYSIS FOR CONVERSION OF C1 SUBSTRATES

9:00-11:00 Martijn Diender (Wageningen University & Research). Microbial cultivation/production techniques and strategies for conversion of C1 substrates

11:00-11:30 Coffee break

11:30-12:30 Martijn Diender (Wageningen University & Research). Microbial cultivation/production techniques and strategies for conversion of C1 substrates. Case study

MODULE 3. PURPLE PHOTOTROPHIC BACTERIA FOR CARBON CAPTURE AND RECYCLING

12:30-13:30 Gabriel Capson-Tojo (Laboratoire de Biotechnologie de l'Environnement, INRAE).

Introduction to Purple Phototrophic Bacteria (PPB)

13:30-15:00 Lunch

15:00-16:00 Gabriel Capson-Tojo (Laboratoire de Biotechnologie de l'Environnement, INRAE). Purple Phototrophic bacteria and resource recovery: why are they interesting?

16:00-17:00 Gabriel Capson-Tojo (Laboratoire de Biotechnologie de l'Environnement, INRAE). Purple Phototrophic bacteria and resource recovery: state of the art

Wednesday 14th June 2023

MODULE 2. ANAEROBIC MICROBIAL CULTIVATION AND CATALYSIS FOR CONVERSION OF C1 SUBSTRATES

9:00-11:00 Martijn Diender (Wageningen University & Research). Practical infrastructure in research in C1 anaerobic microbiology

11:00-11:30 Coffee break

MODULE 3. PURPLE PHOTOTROPHIC BACTERIA FOR CARBON CAPTURE AND RECYCLING

11:30-13:30 Gabriel Capson-Tojo (Laboratoire de Biotechnologie de l'Environnement, INRAE).

Workshop 1: introduction to mechanistic modelling of bioprocesses

13:30-15:00 Lunch

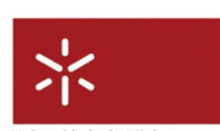
15:00-16:00 Gabriel Capson-Tojo (Laboratoire de Biotechnologie de l'Environnement, INRAE).

Fundamentals of mechanistic modelling of bioprocesses based on Purple Phototrophic bacteria

16:00-17:00 Technical visit to the laboratories of the Institute of Sustainable Processes



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T

hursday 15th June 2023

MODULE 3. PURPLE PHOTOTROPHIC BACTERIA FOR CARBON CAPTURE AND RECYCLING

9:00-11:00 Gabriel Capson-Tojo (Laboratoire de Biotechnologie de l'Environnement, INRAE).
Workshop 2: development and implementation of a model for enriched purple phototrophic bacteria cultures grown outdoors

11:00-11:30 Coffee break

MODULE 4. MICROALGAE FOR CARBON AND NUTRIENTS RECOVERY

11:30-13:00 M^a del Rosario Rodero (Institute of Sustainable Processes, UVa). Microalgal biotechnology for resource recovery from wastewater

13:00-14:30 Lunch

MODULE 5. ORGANIC WASTE BIOCONVERSION VIA ANAEROBIC NO PHOTOTROPHIC PROCESSES

14:30-15:30 Octavio García Depraect (Institute of Sustainable Processes, UVa). Biohydrogen production via dark fermentation

15:30-16:30 Jose Antonio Magdalena (Laboratoire de Biotechnologie de l'Environnement, INRAE). Biohydrogen production via microbial electrolysis cells

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riday 16th June 2023

MODULE 5. ORGANIC WASTE BIOCONVERSION VIA ANAEROBIC NO PHOTOTROPHIC PROCESSES

9:00-11:00 M^a del Rosario Rodero (Institute of Sustainable Processes, UVa). Biogas and biomethane production.

11:00-11:30 Coffee break

11:30-13:00 M^a del Rosario Rodero (Institute of Sustainable Processes, UVa). Biological biogas upgrading and alternative biogas applications

13:00-14:30 Lunch

14:30-16:30 Víctor Pérez (Institute of Sustainable Processes, UVa). Techno-economic analysis of bioprocesses. Case study: biogas bioconversion into ectoine in waste treatment plants

16:30-17:00 M^a del Rosario Rodero (Institute of Sustainable Processes, UVa). Questionnaire and information about the virtual component.

17:00 Raúl Muñoz (Institute of Sustainable Processes, UVa). Closure of the presential course.

Virtual component

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onday 19th June 2023.

MODULE 4. MICROALGAE FOR CARBON AND NUTRIENTS RECOVERY

9:00-10:00 Giuseppina Oliva (University of Salerno). Valorization of microalgae biomass: biorefinery perspectives

10:00-11:00 Elena Ficara (Politecnico di Milano). Modelling of microalgae/bacteria-based bioremediation in open ponds

11:00-11:15 Break

MODULE 5. ORGANIC WASTE BIOCONVERSION VIA ANAEROBIC AND PHOTOTROPHIC PROCESSES

11:15-12:15 Ramón Ganigué (University of Gent). Production of organics acids from organic waste and mixotrophic C1 conversions.

MODULE 6. CO₂ FIXATION AND UTILIZATION VIA ANAEROBIC AND ANOXYGENIC PROCESSES

12:15-13:15 Roxana Ángeles (Institute of Sustainable Processes, UVa). CO₂ conversion into value added products by anoxygenic photosynthetic bacteria

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ednesday 21st June 2023

MODULE 6. CO₂ FIXATION AND UTILIZATION VIA ANAEROBIC AND ANOXYGENIC PROCESSES

9:00-10:00 María Fernanda Pérez Bernal (Laboratoire de Biotechnologie de l'Environnement, INRAE). CO₂ fixation through microbial electrosynthesis

10:00-11:00 Ioannis Vyrides (Cyprus University of Technology). Use of zero valent metal - soluble CO₂ and anaerobic microbes to produce methane or acetic acid or higher molecules.

11:00-11:15 Break

MODULE 7. MICROBIAL PROTEIN PRODUCTION COUPLED TO CARBON CAPTURE

11:15-12:15 Myrsini Sakarika (University of Gent). Coupling microbial protein production to carbon capture and utilization.

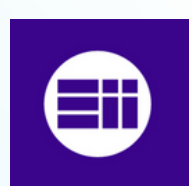
12:15-13:15 Jo de Vrieze (University of Gent). Production of microbial protein from biogas.

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hursday 22nd June 2023.

9:00-11:00 Student presentations

11:00 Closure of the course



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Biological Carbon Capture Technologies

The project Blending Intensive Course "Biological Carbon Capture Technologies" is co-funded by the Erasmus+ programme of the European Union. The content of this publication is the sole responsibility of University of Valladolid and neither the European Commission nor the Spanish Service for the Internationalization of Education (SEPIE) are responsible for the use that may be made of the information disseminated here.



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