

## **Intensive Workshop**

**Theme: BioLab – Laboratory Practices with Bio-Materials**

### **Workshop Modules 9**

**Weeks: 14**

**Hours per week: 2 days per week, 1,5 hours each**

**Total of 54 contact hours- 250 hours total workload**

**ECTS: 10**

**Start: February 14<sup>th</sup>, 2025**

**Students: max. 7**

## **FRAMEWORK**

Architecture and design practices face significant challenges in the Anthropocene era, particularly in creating sustainable societies that integrate harmoniously with nature and achieve ecological and geological balance to mitigate climate change. Architects and designers must adopt a radical shift in their objectives and approaches, addressing the rising demand for key resources, housing and infrastructure without depleting limited natural resources while ensuring healthy and safe living environments. Central to this challenge is the effective use of materials—raw materials, building materials, and their utilisation.

Bio-derived materials, especially innovative smart living materials, are garnering increasing interest due to their potential to adhere to bio-circularity principles. This makes them promising candidates for establishing sustainable frameworks for productions and economies.

The workshop addresses the training needs of doctoral students researching biomaterials for architectural and design applications. The urgency to explore biomaterials and assess their relevance in construction practices is driven by the imperative to achieve sustainable development goals (SDG9-Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation; SDG11-Make cities and human settlements inclusive, safe, resilient and sustainable; SDG12-Ensure sustainable consumption and production patterns and SDG-13-Take urgent action to combat climate change and its impacts).

By adhering to principles of bio-circularity and fostering a transformative shift in material culture, biomaterials hold significant potential to serve as a cornerstone in the development of sustainable urban systems.

This workshop is a collaboration between the **Faculty of Architecture and the Faculty of Fine Arts of the University of Lisbon**. It was developed in collaboration with **BioLab Lisbon**, which will host practical sessions and participative lectures. BioLab is a vibrant community composed of both academic and non-academic researchers and makers, offering a unique framework for interdisciplinary exchange and collaborative input.

**Scientific Board**

Prof. José Nuno Beirão (FAUL-CIAUD)

Prof. Susana Rosado (FAUL-CIAUD)

Prof. Ana Mestre (FBAUL-DE)

**Creation and Coordinatation**

Des. Caterina Plenzick (FAUL/BioLab)

Des. Carolina Delgado (CIAUD/BioLab)

**Tutorial guidance and training:**

Prof. José Nuno Beirão (FAUL-CIAUD)

Prof. Susana Rosado (FAUL-CIAUD)

Prof. Ana Mestre (FBAUL-DE)

Des. Carolina Delgado (CIAUD/BioLab)

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Biol. João Santos (BioLab)

Arch. Rafael Calado (BioLab)

Lab. Techn. Magda Barreira (Polytechnic of Leiria/BioLab)

PhD Tarciana Andrade

Biomed. Eng. Laura sordini (IST-ULisboa)

Des. Guilherme Martins (BioLab)

Arch. Carlos Roque (BioLab)

**WORKSHOP DESCRIPTION**

This is a laboratory-based workshop that focuses on the exploration of new bio-derived materials and their applicability in architecture and design, for new products and building units as well as the transformation and rehabilitation of existing ones, always to improve the sustainable performance of buildings and products.

The workshop follows a hybrid structure, combining theoretical knowledge with practical, hands-on training. Through a series of lectures, presentations, and participative sessions led by experts from various fields, students will gain a foundational understanding of the emerging discipline of regenerative and bio-based architecture and design. Lectures will showcase interdisciplinary research projects and methodologies at the intersection of biotechnology, material engineering, and architecture. These theoretical components are interspersed with laboratory sessions, where students will actively engage in experimental work, fostering a dynamic learning environment that bridges theory and practice.

Students will explore digital tools and technologies integrated into biofabrication. They will be introduced to 3D printing with biomaterials. They will use computer-aided design (CAD) to create prototypes and work with living materials. Computational methods, such as

parametric design, will help optimise material performance. These tools expand fabrication possibilities and support innovative, sustainable designs.

Special sessions will familiarise students with wet lab practices and the appropriate use of machines and tools for working with microorganisms. Researchers will integrate theoretical knowledge with presentations and illustrations of their research in biomaterials and architecture, aligning with the principles of sustainable reuse within the circular economy framework.

The practical sessions at the BioLab are designed to help students understand and test new biologically based materials for architecture and design. The laboratory practice aims to scientifically comprehend the potentials, characteristics, behaviours, and biological cycles of the materials under study.

Within the dynamic environment of the BioLab, participants will be introduced to the state of the art in biomaterials, with a particular focus on materials explored by BioLab researchers and staff, including algae-derived biopolymers, mycelium-based composites, bio-pigments, and bio-composites derived from solid waste.

Depending on the student's interests, specific materials may take on a more central role during the workshop.

The workshop will also provide theoretical input on conducting documentation and data collection during experimental research. Additionally, it will include an introduction to data analysis and statistical methods, offering participants a comprehensive understanding of the research approach and the necessary setup for experimental investigations.

## **OBJECTIVES**

The Workshop program aims to achieve the following objectives:

- Develop knowledge about biological materials available for application in various architectural and product design domains with competitive (economic and ecological) potential.
- Develop laboratory skills to explore and analyse biomaterials, focusing on their behaviors, biological origins, performative properties, and applications in architectural and design contexts, while critically assessing their challenges, limitations, and promising potential.
- Develop the ability to scientifically and experimentally pursue necessary experiences with materials to demonstrate their qualities and advantages over industrial competitors.
- Develop technical skills (methodological and tool-related) to address the complexities of the study problem.

- Develop technical and laboratory skills for the study and approach of biomaterials.
- Develop capacities for synthesising and communicating ideas and visions of development implicit in the use of biomaterials, producing scientific and philosophical discourses supporting their advantages in contributing to the formation of sustainable societies in harmonic balance with the planet.

## PROGRAMME

The workshop is organised into modules, with each module comprising several sessions distributed throughout the workshop period from February to May 2025.

The session will take place every Monday from 10:00-11:30 and Wednesday from 14:00-15:30 and will be developed according to the following program of activities.

Please note: The timetable can slightly change.

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## MOD 1. Introduction to Bio-Materials Research (to be completed)

### **Presentation of the Curricular Unit and BioLab State of the Art Research and Activities Prof. José Nuno Beirão (FAUL-CIAUD) and Head of BioLab Rafael Calado (BioLab)**

On the scheduled start date of the workshop, Professor José Beirão will lead the opening session. He will provide an overview of the workshop, introducing its goals, structure, and key themes. This introduction will include an explanation of the evaluation process, outlining how participants' contributions will be assessed, along with a clear timeline of the main deadlines. Architect Rafael Calado will provide an overview of BioLab's research and activities during this workshop module, showcasing projects developed by researchers, residents, and collaborators. Participants will explore the lab's archive of materials and artefacts, gaining insights into the machines, techniques, and processes used to create these outcomes. This session aims to inspire students by demonstrating the potential applications of digital fabrication and soft robotics in the context of biomaterials.

### **Computational Design applied to Biomaterials: The Geometries of Nature and their applications through Modelling**

#### **Lecturer: Prof. José Beirão (FAUL-CIAUD)**

In this lecture, Professor José Beirão will introduce computational approaches to modelling natural geometries. Topics include the Superformula by Johan Gielis, used to generate organic forms, fractals for recursive natural patterns, Voronoi diagrams for spatial divisions, and metaball algorithms for smooth volumetric transitions. The session will explore how these methods can inform architectural and design applications.

### **Circular Design & Bio Strategies for Circularity**

**Lecturer: Prof. Ana Mestre (FBAUL-DE)**

The following two lectures, one theoretical and one practical session, will take place on two different days and will be given at FBAUL.

The module introduces the concept of “Design for the Circular Economy”, and presents practical examples of circular design strategies applied to design, of which bio-strategies for circularity stand out. The design examples presented will be contextualised under “Circular Product Design. A Multiple Loops Life Cycle Design Approach for the Circular Economy” (Mestre & Cooper, 2017). In this module, the students will explore a practice-based approach using strategies and criteria that will guide them in assessing, as well as prioritising circularity in the design process. A practical group exercise will be conducted during the sessions.

### **Biomimetics and biomimicry Research methodologies**

**Lecturer: PhD Tarciana Andrade**

Tarciana Andrade will present her PhD research conducted at FAUL and CIAUD, titled “*Bimetal Biomodule: Kinetic Module for Self-Shading Façades*.” Her study explores the bioinspiration drawn from plant movements to influence the behaviour of bimetal, a smart material, enhancing its functional properties for innovative shading systems.

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## **MOD 2. Introduction to laboratory practice, safe use of machines and sterile work with microorganisms.**

**Lecturer/Instructor: Biologist João Canilho Santos & Laboratory Technician Magda Barreira**

As part of this Workshop, the instructed lectures will focus on laboratory security practices, the proper use of equipment and uses, as well as the fundamentals of biotechnology techniques applied to various areas outside of biology. The lectures will comprise both theoretical and practical components, providing participants with the opportunity to explore these techniques first-hand.

The aim of this module is to empower participants with the skills for an independent and accurate experience within a wet lab setting. The modules of the lectures include:

- **Laboratory Security Measures:** Thorough coverage of safety protocols and procedures to ensure a secure working environment.
- **Molecular Biology Equipment and Techniques:** In-depth exploration of equipment used in molecular biology, coupled with practical demonstrations of fundamental techniques.
- **Microbiology Equipment and Techniques:** Comprehensive examination of equipment pertinent to microbiology, accompanied by hands-on exercises in essential microbiological techniques.
- **Fundamentals of Biotechnology Using Living Organisms:** Exploration of the core principles and applications of biotechnology, emphasising projects involving living organisms.

- **Basic introduction to composite materials:** This module provides a basic introduction to composite materials, explaining their structure and key components: **matrix**, **fillers**, the session will also introduce **additives**, such as plasticizers, that modify material properties. The module will clarify the difference between natural and synthetic **polymers**.
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## **MOD 3. Materials Design for Architecture and Design: A new field of work, research examples and field practices.**

### **Lectures on Sustainable Materials Design for Architecture and Design and hands-on Protocols for DIY Bio-fabricating materials**

#### **Lecturer: Designer Carolina Vasco Costa Delgado**

Materials Design has emerged as an autonomous field by makers collaborating from different areas—as biology, architecture, and design—to develop sustainable solutions. In this module, the students will be presented with the main theory of sustainable materials and the differences between bio-based materials sources, techniques, and applications. They will be introduced to DIY Protocols for Bio-fabricating materials.

#### **Materials Design Theory**

##### *Design for Sustainability*

- General Objectives of Sustainability and Circular Design: SDGs, Green Deal, Doughnut - planetary boundaries, Externalities, Products that flow, Longer Life option, Eco-efficient vs. Eco-effective.
- Biostrategies: Biophilic hypothesis, Biomimicry, Resilient Design, Regenerative design, Biotechnology, and a Symbiotic Design Practice scheme.
- A short story of Plastics

##### *Design Through Practice:*

- FabLab and BioLab as enhancers of learning, creativity, collaboration, and research.
- Fabricademy – Personal experience at Waag – TextileLab Amsterdam.
- What are Bio-based materials - by source, by technique, by application
- Different bio-based materials showcase - gelatine, agar, alginate, PHA (Polyhydroxyalkanoate), bacterial cellulose, fruit leather, jellyfish leather, fish leather, seaweed-based fibres, pits, peels and shells composites, spider silk and human hair, mycelium leather and bricks...

#### **Bio-Materials Fabrication - Protocols for DIY Bio-fabricating materials**

1. **Bain-marie process** - temperature process for gelatine, Agar, Starch
2. **Crosslink process** - Sodium Alginate gelation with Calcium chloride solution

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## MOD 4. Introduction to Mycelium-Based Fabrication for Architecture and Design

**Lecturer/Instructor: Caterina Plenzick**

### **Lecture: Mycelium Research Cluster: from biological taxonomy to experimental fabrication in Architectural Design**

Caterina Plenzick will introduce students to the research field of mycelium-based fabrication, exploring mycelium from a biological perspective, illustrating the state of the art in its main applications and eventually showcasing key research areas and pioneering projects. Special focus will be given to product design and architecture.

### **Lecture: Introduction to Mycelium Fabrication Processes and Material Characteristics**

This lecture delves into the cultivation and production techniques of mycelium composites for architectural and design applications. It will cover key aspects such as environmental conditions, tools, raw materials, and the behaviour of the living organism itself. It will illustrate the material's unique potentials and challenges, providing an understanding of the nuanced differences between designing with living organisms and conventional materials. The lecture will also highlight the opportunities and constraints inherent in this innovative approach to material design.

**Activities: 3 applied sessions are planned, and they are integrated into other Modules of this workshop and active Projects at BioLab:**

### **Module 6: Bio Materials 3D Printing: Rafael Calado, Caterina Plenzick, Laura Sordini**

Students will learn to use hydrogels and printable composite pastes derived from waste materials to fabricate objects that can serve as habitats for living materials.

### **Module 8:**

**Field Trips Mycelium Observation and Sampling.** A field trip to an urban park will allow participants to observe local mushroom strains in their natural habitats. The excursion includes hands-on activities such as harvesting samples, which will later be cloned in the laboratory to create starter cultures.

**Lab Sessions.** Following the field trips, participants will engage in practical lab sessions that bridge observations from the field with laboratory research. These sessions will introduce essential tools, machines, and techniques, including:

- Laminar Flow Bench: Demonstrating sterile workflows and safety protocols for handling microorganisms.
- Incubators: Utilizing controlled environments to grow and study cultures.
- Cloning and Mother Culture Preparation: Cloning wild mushroom samples collected during the field trip and preparing mother cultures for further experimentation.

**Project: official name Bombarda Project—Mycelium Brick Production**

**Team Leads: Rafael Calado, Caterina Plenzick**

**Collaborators: Talin Frantz Magda Barreira, Laura Sordini**

Students will be involved in the production of mycelium bricks for an ongoing experimental project: constructing a meditative shrine for the Jardim Bombarda community in Lisbon. Through hands-on participation, they will learn how to create structural units with mycelium composites and Structure Fabrication.

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## **MOD 5. Research Structure and Documentation**

**Lecturer/Instructors: Designer Carolina Delgado, Caterina Plenzick**

Assignments during the semester starting with Carolina's lecture on documentation, Students will conclude their material experiments, documenting them through photography and compiling concise textual reports. These reports will encompass the process description, along with their considerations, conclusions, and impressions derived from the process.

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## **MOD 6. Digital Fabrication and Soft Robotics**

**BioLab State of the Art— Hands-on Digital Fabrication and Soft Robotics**

**Lecturer/Instructor: Arch. Rafael Calado, Des. Guilherme Martins, Arch. Carlos Roque, Des. Caterina Plenzick and Eng. Laura Sordini**

### **Hands-On Digital Fabrication and Soft Robotics**

This session focuses on practical applications of digital fabrication technologies available at BioLab; Students will gain practical experience with them, focusing on how these technologies can be applied to fabricate or design with biomaterials.

Specific activities include:

1. **Bio Materials 3D Printing: Rafael Calado, Caterina Plenzick, Laura Sordini**
  - Students will learn to use hydrogels and printable composite pastes derived from waste materials to fabricate substrates that can serve as habitats for living materials.
2. **Soft Robotics and Inflatable Objects: Rafael Calado, Guilherme Martins**
  - Participants will explore the design and fabrication of soft robotic components and inflatable structures using biomaterials.
3. **Mould Construction Techniques: Carlos Roque**
  - This session will demonstrate methods for creating moulds for biomaterial cultivation and shaping.



Students will be given the opportunity to select a specific material, technique or machine to fabricate, cultivate, engineer, or refine their biomaterials of choice, building upon the foundations established in the previous session.

They will independently undertake their small projects over the subsequent weeks, complemented by additional lectures and tutoring sessions as outlined in the established program.

The aim is to provide hands-on learning with biomaterials, specifically Mycelium, exploring the possibilities, limits, and implications of working with them in the practice of architecture and design. Simultaneously, students will have the chance to apply the laboratory techniques illustrated in the first session through a project of their own interest.

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## **MOD 7. Advanced Topics in Decision Support and Information Management**

**Lecturer: Prof. Susana Rosado**

Lectures on Advanced Topics in Decision Support and Information Management combined with periodic monitoring of students' work throughout the workshop in order to help with planning, management and future analysis of the information produced. One of the objectives of this workshop is to develop technical skills (methodological and tool-related) to address the complexities of the study problem. An emphasis on information management for decision support is also significant. This may involve algorithmic thinking and programming tools to aid in software use and also effective data collection and analysis, including constructing surveys and other forms of data collection that will be produced during the workshop. It is recognized that defining the object of study and its characteristics is essential to facilitate the use of mathematical and statistical tools for rigorous and informed decision-making. Planning, managing and analysing the information needed is essential. This contribution would be important to help connect the academy with the industry in a more effective way and in that sense the work developed during the workshop will more effectively contribute to the success of the research ideas and its implementation.

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## **MOD 8. From Ecosystems to Laboratory and Back**

**Exploring the Natural Environments of Living Organisms to expand our understanding of their role beyond the human perspective.**

**Lecturer/Instructor: Biologist João Canilho Santos, Designer Caterina Plenzick and Engineer Laura Sordini**

João Santos, Caterina Plenzick, and Laura Sordini will lead field trips to explore the natural environments of organisms studied at BioLab, such as mycelium, bacteria, and algae. These

excursions aim to broaden the laboratory-focused perspective by situating these organisms within their ecological contexts, emphasising their integral roles in complex ecosystems before they are harvested and cultivated in controlled settings.

The sessions are designed to combine theoretical reflections, hands-on lab activities, and immersive field trips. The field trips, in particular, will provide a framework for critical reflection on topics such as interspecies design, more-than-human perspectives, and the environmental impact of anthropogenic activities. Participants will first explore the central role these microorganisms play in their natural ecosystems before considering their potential applications in design and architecture to address ecological challenges.

## **Field Trips**

### **Mycelium Observation and Sampling**

A field trip to an urban park will allow participants to observe local mushroom strains in their natural habitats. The excursion includes hands-on activities such as harvesting samples, which will later be cloned in the laboratory to create starter cultures.

### **Algae Exploration**

A second field trip, focusing on macroalgae, will explore marine environments to understand the ecological significance of these organisms. From serving as primary producers that support aquatic food webs to helping maintain water quality, providing habitats for marine life, and contributing to carbon sequestration. Additionally, their surfaces are home to a wide range of microorganisms, including bacteria and fungi, which contribute to nutrient cycling, disease resistance, and overall algal health. By studying these interactions, we gain valuable insights into the symbiotic relationships that sustain coastal ecosystems. Understanding both the algae and their microbiomes is essential for conservation and maintaining the health of our oceans.

## **Lab Sessions**

Following the field trips, participants will engage in practical lab sessions that bridge observations from the field with laboratory research. These sessions will introduce essential tools, machines, and techniques, including:

- Laminar Flow Bench: Demonstrating sterile workflows and safety protocols for handling organisms in sterile conditions.
- Incubators: Utilizing controlled environments to grow and study cultures.
- Cloning and Mother Culture Preparation: Cloning wild mushroom samples and macroalgae microbiomes collected during the field trip and preparing mother cultures for further test experimentation.

Through this integrated approach, participants will gain hands-on experience while expanding their laboratory perspective, reinforcing the connection between the natural world and bio-based design applications.

N.B.: The field trips are scheduled to begin in March, with algae observation starting in April. Exact dates will be communicated in advance based on weather conditions and will probably take place on Saturdays.

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## MOD 9 Final Presentation

**Coordinator: Professor José Beirão, Prof. Susanna Rosado**

During the second half of the workshop, beginning with session 2, architecture and design students will explore how biotechnology intersects with their fields, fostering new practices, methodologies, and outcomes. This session will include a review of the practical work conducted by students since session 2.

The presentation of student work will span two days. On the first day, students will showcase their material studies, detailing the processes undertaken and presenting the outcomes alongside theoretical reflections on the interplay between biotechnology, architecture, and design.

The second day will focus on a collaborative review of the projects, involving students, lecturers, and instructors. This review will aim to develop strategies for translating experimental results into hypothetical applications for architecture and design, as well as outlining the sequence of experiments needed to validate these hypotheses.

### Contact

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# Bio-materials Workshop Timetable

	Date	Module	Session	Session		Time	Duration in h	Location
Week 1								
Friday	14/02/2025	MOD1	1	Presentation of the Course	José Beirão and Rafael Calado	14:30:00-16:00	2,00	BioLab
Week 2								
Monday	17/02/2025	MOD2	2	Laboratory Security Measures	Magda Barreira/ João Santos	10:00-11:30	1,50	BioLab
Wednesday	19/02/2025	MOD2	3	Molecular Biology Equipment and Techniques		14:00-15:30	1,50	BioLab
				Microbiology Equipment and Techniques				
Fundamentals of Biotech. Using Living Organisms								
Week 3								
Monday	24/02/2025	MOD3	4	Materials Design Theory	Carolina Delgado	10:00-11:30	1,50	BioLab
Wednesday	26/02/2025	MOD1	5	Computational Design applied to Biomaterials	José Beirão	14:00-16:30	2,00	FAUL
		MOD1		Bioinspired Research	Tarciana Andrade	16:00-17:00	1,00	on-line
Week 4								
Wednesday	05/03/2025	MOD4	6	Mycelium Research Cluster:	Caterina Plenzick	14:00-15:30	1,00	BioLab
Thursday	06/03/2025	MOD5	7	Students Present Embryo Idea + Assignment	J. Beirão/ S. Rosado/ C. Plenzick/ C. Delgado	10:00-11:30	1,50	BioLab
		MOD5		Research Documentation Lecture	Carolina Delgado	11:00-13:00	1,50	BioLab
Week 5								
Monday	10/03/2025	MOD3	8	Bain-Marie - gelatine, agar, starch	Carolina Delgado/ Caterina Plenzick	10:00-11:30	1,50	BioLab
Wednesday	12/03/2025	MOD3	9	Crosslink process - Alginate Lecture	Carolina Delgado/ Caterina Plenzick	14:00-15:30	1,50	BioLab
Week 6								
Monday	17/03/2025	MOD4	10	Introduction to Mycelium Fabrication	Caterina Plenzick	10:00-11:30	1,50	BioLab
Wednesday	19/03/2025	MOD6	11	Digital Fabrication and Soft Robotics	Rafael Calado/ Guilherme Martins	14:00-15:30	1,50	BioLab
Week 7								
Monday	24/03/2025	MOD6	12	Bio Materials 3D Printing	Caterina Plenzick/ Laura Sordini	10:00-11:30	1,50	BioLab
Friday	28/03/2025	MOD7	13	Advanced Topics in Decision Support and Information	Susana Rosado	14:00-15:30	1,50	FAUL
Week 8								
Monday	31/03/2025	MOD5	14	Research follow-up	J. Beirão/ S. Rosado/ C. Plenzick/ C. Delgado	10:00-11:30	1,50	BioLab
Wednesday	02/04/2025	MOD5	15	Circular Design & Bio Strategies for Circularity Lecture	Ana Mestre	10:00-12:00	2,00	FBAUL
				Practice	Ana Mestre	14:00-17:00	3,00	FBAUL
Week 9								
Monday	07/04/2025	MOD6	16	Field Trip Mycelium	João Santos/ Caterina Plenzick/ Laura Sordini	10:00-11:30	1,50	BioLab
Wednesday	09/04/2025	MOD5	17	Students Pitch presentation (5min Research focus)	José Beirão/ Caterina Plenzick/ Carolina Delgado	14:00-15:30	1,50	BioLab
Week 10								
Tuesday	22/04/2025	MOD8	18	Moulds Construction Basics	Carlos Roque	10:00-12:30	2,50	To be defined
Thursday	24/04/2025	MOD8	19	Lab Session	João Santos/ Caterina Plenzick/ Laura Sordini	14:00-15:30	1,50	BioLab
Week 11								
Monday	28/04/2025	MOD8	20	Field Trip Algae	João Santos/ Caterina Plenzick/ Laura Sordini	10:00-11:30	1,50	To be defined
Wednesday	30/04/2025	MOD8	21	Lab Session	João Santos/ Caterina Plenzick/ Laura Sordini	14:00-15:30	1,50	BioLab
Week 12								
Monday	05/05/2025		22	Independent Project Development and Exploration	Free-practice	10:00-11:30	1,50	FBAUL
Wednesday	07/05/2025		23	Free-practice	Free-practice Ana Mestre	14:00-16:00	1,50	FBAUL
Week 13								
Monday	12/05/2025		24	Bio Strategies for Circularity: Practice	Ana Mestre	10:00-13:00	3,00	BioLab
Wednesday	14/05/2025		25	Discussion/ Tutoring Session	J. Beirão/ S. Rosado/ C. Plenzick/ C. Delgado	14:00-17:00	3,00	BioLab
Week 14								
Monday	19/05/2025		26	Independent Project Development and Exploration	Free-practice	10:00-13:00	3,00	BioLab
Wednesday	21/05/2025	MOD9	27	Final presentation	J. Beirão/ S. Rosado/ A. Mestre/ C. Plenzick/ C. Delgac	14:00-17:00	3,00	BioLab

**Contact hours:** 54,00  
 Individual work: 196,00  
**250,00**