

CIRCULAR GREEN NANOBIOTECHNOLOGY

PROGRAM

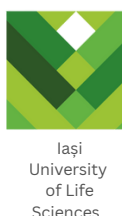
BLENDED INTENSIVE PROGRAMME (BIP)

ERASMUS +

Warsaw University
of Life Sciences



210
YEARS OF SGGW
TRADITION



VIRTUAL COMPONENT

Duration: 3 weeks

**Workload: 25 contact hours + 15 hours
of individual work**

Format: Online (synchronous & asynchronous)

Platforms: MS Teams, Miro, Padlet, Mentimeter

Learning objectives:

build a shared
interdisciplinary
knowledge base

prepare
students for
experimental
laboratory
work

develop
international
teamwork and
digital
collaboration
skills

introduce
sustainability,
biosafety, and
circular
economy
principles

VIRTUAL COMPONENT

WEEK 1 – Date: May 29, 2026

Foundations of Circular Green Nanobiotechnology

Module 1: Introduction to Circular Nanobiotechnology

**Lead: Warsaw University of Life Sciences –
SGGW**

- Principles of circular economy and green chemistry
- Life cycle assessment of nanomaterials
- “Do No Significant Harm” (DNSH) principle
- Ethical and environmental aspects of nanotechnology

Activities:

interactive lecture, short quizzes, group discussion

VIRTUAL COMPONENT

WEEK 2 – Date: June 5, 2026

Bio-based and Biomedical Perspectives

Module 2: Bio-based Nanomaterials and Plant Polymers

Lead: University of Potsdam

- Starch, cellulose, chitosan and plant-derived polymers
- Structure–function relationships at the nanoscale
- Design of biodegradable and renewable nanostructures

Module 3: Biomedical and Cellular Interactions of Nanomaterials

Lead: Lithuanian University of Health Sciences & SGGW

- Nanoparticle–cell interactions
- Oxidative stress and cellular adaptation
- Basics of nanosafety testing and in vitro models

Activities: lectures, case-study analysis, teamwork

VIRTUAL COMPONENT

Week 3: June 12, 2026.

Integration and Team Project

Module 4: Team Project – “Design Your Green Nanomaterial”

**Lead university: Daugavpils University – DU (Latvia)
Contributing partners: SGGW, University of Potsdam, LSMU, Iași University of Life Sciences (IULS)**

Joint supervision by all partner universities

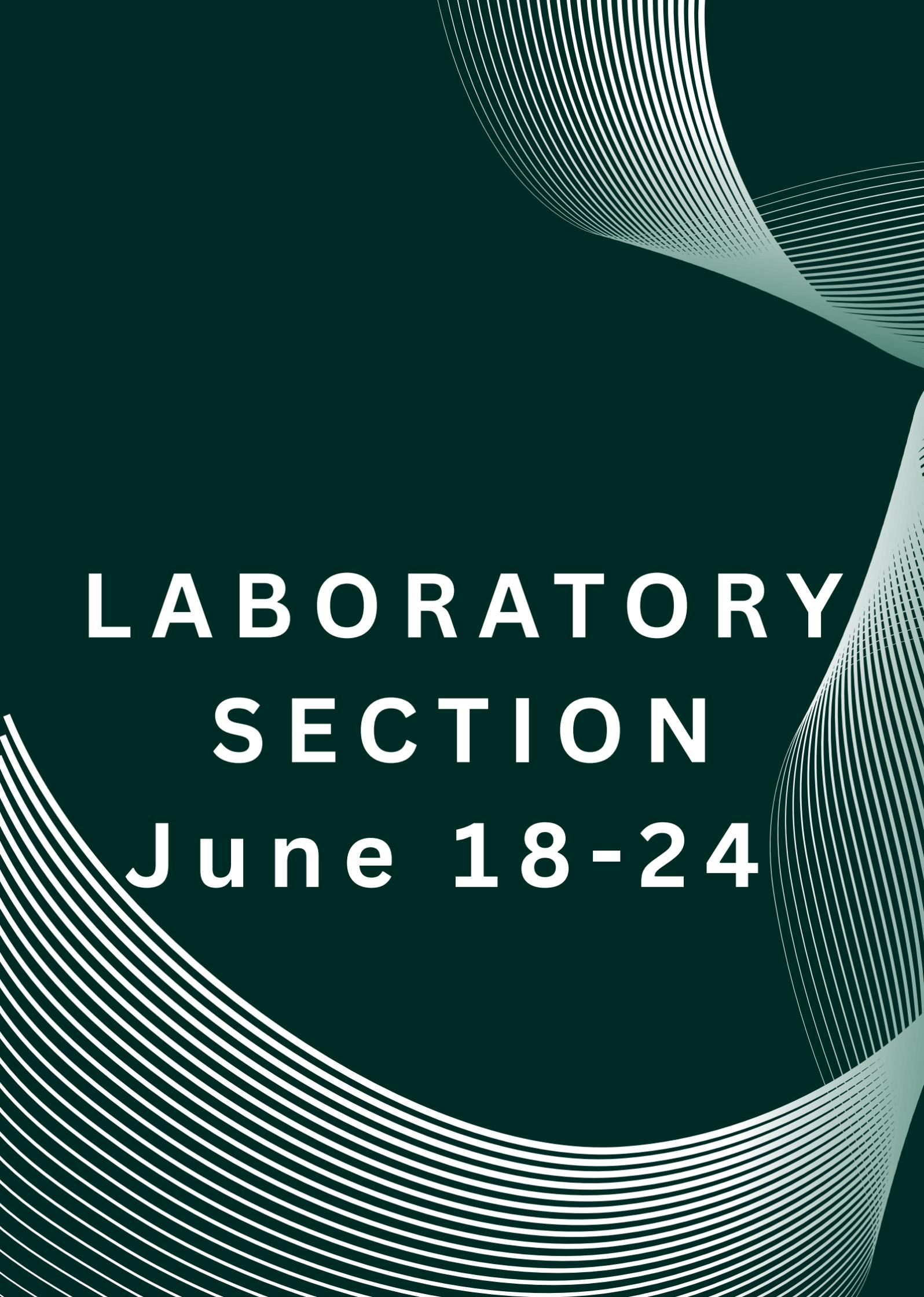
- interdisciplinary team formation
- design of a bio-based nanomaterial concept
- preliminary sustainability and biosafety assessment
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Digital tools:

- Miro (concept mapping)
- Padlet (project documentation)

Outcome:

- short pre-laboratory report
- project presentation



**LABORATORY
SECTION
June 18-24**

Day 1 – Orientation & Scientific Context

Agenda:

- 11:00-12:00 Registration (SGGW Library)
- 12:00-13:00 Welcome session and programme overview
- 13:00-14:00 Introduction to laboratory infrastructure, facilities and safety briefing
- 14:00-15:00 Lunch
- 15:00-16:00: discussion of team projects developed during the virtual phase
- 16:00-17:00 alignment of experimental plans and expectations
- 18:00-21:00 Evening welcome and networking refreshments

Goal:

To ensure a shared understanding of the programme objectives, laboratory procedures, and safety principles, and to align virtual project concepts with on-site experimental work.

Day 2 – Eco-Friendly Extracts for the Green Synthesis of Nanomaterials

Agenda:

9:00-10:00 Introduction to eco-friendly
extract-based synthesis (Build.23)

11:00-13:00 Preparation of plant-based
extracts

13:00-14:00 Microbial-derived extracts for
nanomaterial synthesis

14:00-15:00 Lunch

15:00-16:00 Cell-based and in vitro extract
systems

16:00-17:00 Wrap-up discussion and reflection

18:00-21:00

Goal:

provide hands-on experience with eco-friendly
extract-based synthesis of nanomaterials and
to demonstrate how plant, microbial, and in
vitro biological systems influence synthesis
efficiency, sustainability, and material
properties.

Day 3 – Green Synthesis of Nanomaterials

Agenda:

- 9:00-12:00 Synthesis of bio-based nanomaterials (build. 23)
- 12:00-13:00 Application of green chemistry approaches
- 13:00-13:30 Lunch
- 13:30-14:30 Surface functionalization strategies (build.23)
- 15:00-15:45 Transfer to the POLIN Museum of the History of Polish Jews
- 16:00 -18:00 Guided tour of the POLIN Museum of the History of Polish Jews

Goal:

To acquire practical skills in the green synthesis and functionalisation of bio-based nanomaterials while understanding sustainable and environmentally responsible laboratory practices.

Day 4 – Physicochemical Characterisation

Agenda:

9:00-11:00 UV-Vis and FTIR spectroscopy(build.23)

11:30-13:30 DLS and zeta potential analysis

13:30-14:30 Lunch

14:30-16:30 Interpretation of size, stability, and surface properties

16:45 Meeting point in front of the Crystal Hall build.

16:00-17:00 SGGW University campus tour

Goal:

To learn how to characterise nanomaterials using complementary analytical techniques and to interpret physicochemical data relevant to nanoscale structure and functionality.

Day 5 - Advanced Structural Analysis

Agenda:

9:00-11:00 Lecture characterisation of nanoparticles and nanomaterials

11:30-13:30 SEM and TEM microscopy (build.23)

13:30-14:30 Lunch

14:30-15:30 Evaluation of morphology and nanostructure

15:45- 17:00 Correlation of structure with synthesis parameters

Goal:

To learn how to characterise nanomaterials using complementary analytical techniques and to interpret physicochemical data relevant to nanoscale structure and functionality.

Day 6- Nanosafety and Biological Interactions

Agenda:

9:00-11:00 nanoparticle-cell interaction studies with use of in vitro biological models
11:00-13:00 assessment of cytotoxicity and biocompatibility - in vitro cell lines
13:00-14:00 Lunch
14:00-15:30 bacterial response and biocompatibility assessment
15:30-16:30 evaluation of nanomaterial effects on aquatic plant models (duckweed)
16:45- 17:30 Transfer to the Royal Łazienki Park (Łazienki Królewskie)
17:30 -19:00 Guided cultural visit to the Royal Łazienki Park (Łazienki Królewskie)

Goal:

To raise awareness of nanosafety principles and evaluate biological responses to nanomaterials in relevant in vitro systems. The aim is to integrate multidisciplinary datasets and enhance analytical thinking by connecting material properties with biological and safety outcomes.

Day 7- Integrated Nanosafety Assessment and Summary of Biological Interactions

Agenda:

09:00–09:30 overview of biological models used in the programme

09:30–10:30 summary of in vitro nanosafety results

11:00–12:00 summary of bacterial interaction studies

12:00–13:00 summary of plant-based interaction studies

13:00–14:00 integrated discussion and final conclusions

Goal:

To integrate and critically evaluate results obtained from in vitro cell lines, bacterial models, and aquatic plant assays, enabling participants to understand nanosafety, biological interactions, and environmental relevance of bio-based nanomaterials in a comprehensive and interdisciplinary manner.

POST-LABORATORY VIRTUAL COMPONENT

Date: June 30, 2026

Lead university:

**Warsaw University of Life Sciences – SGGW
(Poland)**

Partner universities involved:

- University of Potsdam (Germany)**
- Lithuanian University of Health Sciences-
LSMU (Lithuania)**
- Iași University of Life Sciences-
IULS (Romania)**
- Daugavpils University – DU (Latvia)**

POST-LABORATORY VIRTUAL COMPONENT

Agenda:

09:00–09:15 opening and objectives of the post-laboratory session

09:15–11:00 summary of laboratory results – in vitro models, bacterial interaction studies and plant-based interaction studies

11:30–13:00 integrated discussion and sustainability assessment

comparison across biological models
environmental, agricultural, and veterinary implications

alignment with circular economy principles

13:00–14:00 student and expert feedback
discussion of results, limitations, and applications

Goal:

Integrate and critically evaluate experimental results obtained from in vitro cell lines, bacterial models, and aquatic plant assays, and to assess the nanosafety, sustainability, and real-world relevance of bio-based nanomaterials.

**See you online and on
campus
learn, collaborate, and
innovate sustainably!**



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