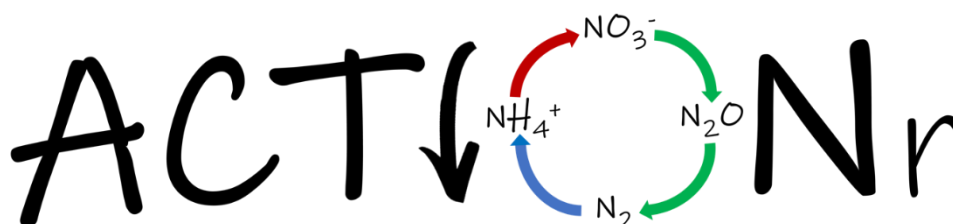


PhD summer school

“Biological Nitrification Inhibition: Integrating Microbial Functions, Plant Traits, and Technological Innovations for Sustainable Nitrogen Cycling”

University of Thessaly
12-16 May 2025

Organized by:



ACTIONr: Research Action Network for Reducing Reactive Nitrogen Losses from Agricultural Ecosystems

Local Contact:
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Monday, 12 May	
Afternoon session	
13:30-14:30	Opening lecture (public): Christa Schleper: "What is wrong with the Nitrogen cycle - and how can we fix it?" (Hippocrates Amphitheater, School of Health Sciences, Viopolis)
14:45-16:45	Presentation round with participating students – 5 min each (Teleconference Room, 1st Floor, DBB)
17:00-18:00	Tour of the Plant and Environmental Biotechnology Laboratory (1st Floor, DBB)
20:30	Dinner

Tuesday, 13 May	
Morning session	
10:00-11:00	Evangelia Papadopoulou: "Current methodologies and advancements in screening BNI compounds" (Teleconference Room, 1st Floor, DBB)
11:10-11:30	Coffee break
Practical training	
11:30-14:00	Fast-track, high-throughput screening for BNIs in ammonia-oxidizing bacteria - Evangelia Papadopoulou
14:00-15:00	Discussion on screening data
15:00	Light lunch and travel to Paos Monastery

Wednesday, 14 May	
Morning session	
10:00-11:10	Logan Hodgskiss: "The biofilm lifestyle of AOA: Implications for physiology and nitrification inhibition"
11:00-11:30	Coffee break
11:30-12:30	Christina Hazard: "Soil virus ecology and potential of 'soil phage therapy' for controlling nitrification"
12:30-14:00	Lunch (Courtyard of Paos Monastery)
Afternoon session: Practical training	
14:00-17:30	Key & frequently overlooked points in amplicon sequencing analysis of environmental microbiomes – Part A - Sotirios Vasileiadis
20:30	Summer School dinner

Thursday, 15 May	
Morning session	
10:00-11:00	Kalliope Papadopoulou: "Specialized metabolism in plants: Driving growth and adaptation to nitrogen availability"
11:00-11:30	Coffee break
11:30-12:30	Maria Hernandez-Soriano: "Wheat genotype-driven recruitment of rhizosphere microbiome to improve nitrogen use efficiency"
12:30-14:00	Lunch (Courtyard of Paos Monastery)
Afternoon session: Practical training	
14:00-17:30	Key & frequently overlooked points in amplicon sequencing analysis of environmental microbiomes – Part B - Sotirios Vasileiadis

Friday, 16 May	
Morning session	
9:00-10:15	Cecile Gubry -Rangin: "Plant growth stage and conditions: Influence for BNI efficiency"
11:00-11:30	Coffee break
11:30-12:30	Benjamin Thiombiano: "Harnessing the nitrogen Cycle: Chemical ecology driving future innovations in nitrogen management"
12:30-13:00	Final discussion
Afternoon session:	
13:00	Closure of Summer School (take away lunch will be provided)

About this course

This summer school aims to provide an overview of the Biological Nitrification Inhibition (BNI) and its role in regulating nitrogen cycling in soil systems. Through lectures by leading scientists in the fields of environmental microbiology, microbial ecology, plant biotechnology, and soil biogeochemistry, participants will explore the mechanisms underlying BNI, the physiological and ecological roles of ammonia-oxidizing microorganisms, and the potential for harnessing plant metabolic pathways and traits to improve nitrogen use efficiency. The course will also examine how plant-derived nitrification inhibitors can contribute to sustainable nitrogen management and mitigate nitrogen losses in agricultural systems. Theoretical sessions will be complemented by practical training, including high-throughput screening methods for BNI activity, amplicon sequencing techniques for microbial community analysis, and key aspects of big data analysis. Participants will be introduced to essential concepts for handling large biological datasets, covering principal component analysis (PCA) plots and clustering methods as fundamental tools for the interpretation of data related to BNI mechanisms and microbial interactions. Additionally, participants will explore novel approaches, such as soil phage therapy for microbial nitrogen cycling management, as well as strategies for breeding crops with enhanced BNI capacity. The program will feature discussions on the application of BNI in agricultural systems, highlighting current industry perspectives and future research directions. Lectures and laboratory sessions will provide participants with hands-on experience in state-of-the-art methodologies for assessing BNI activity and its interactions with microbial communities. The course will be in English.

Topics covered

- Mechanisms of Biological Nitrification Inhibition: Plant-derived compounds and microbial interactions
- High-throughput screening methods for BNI activity
- The importance of ammonia oxidation physiology for sustainable cropping systems
- Managing and interpreting large biological datasets
- Plant metabolic pathways and traits contributing to BNI
- Soil phage therapy for managing microbial nitrogen cycling
- Industry perspectives on BNI applications in agriculture

Speakers/Tutors

- [Prof. Christa Schleper, University of Vienna](#)
- [Assist. Prof. Evangelia Papadopoulou, University of Thessaly](#)
- [Dr. Logan Hodgskiss, University of Vienna](#)
- [Dr. Christina Hazard, University of Lyon](#)
- [Assist. Prof. Sotirios Vasileiadis, University of Thessaly](#)
- [Prof. Kalliope Papadopoulou, University of Thessaly](#)
- [Dr. Maria Hernandez-Soriano, John Innes Centre](#)
- [Prof. Cecile Gubry-Rangin, University of Aberdeen](#)
- Dr. Benjamin Thiombiano, Syngenta, Switzerland,

Research methods and skills covered

- Techniques for measuring BNI activity and nitrification inhibition profiles
- Workflows for analyzing and interpreting large biological datasets
- Practical methods for assessing microbial community composition using amplicon sequencing techniques

Learning objectives

By the end of the course, participants will:

- Gain insights into the physiological and ecological roles of ammonia-oxidizing microorganisms and their interactions with plants

- Learn how plant metabolic pathways and traits contribute to improving nitrogen use efficiency and sustainable agricultural practices
- Develop hands-on experience with high-throughput screening methods for BNI activity and amplicon sequencing techniques for analyzing microbial communities
- Gain practical skills in working with big data workflows for analyzing and interpreting large biological datasets related to the impact of BNI on the nitrogen cycle
- Gain knowledge of novel strategies for managing microbial nitrogen cycling, including soil phage therapy
- Learn the latest industry perspectives on BNI applications in agricultural systems and the potential for breeding crops with enhanced BNI capacity

Target group, capacity and ECTS credits

PhD students and junior postdocs with experience in environmental microbiology and ecology. Knowledge of nitrogen cycling and microbial physiology is advantageous but not required. The course has a capacity of 18–20 participants.

Upon successful completion of the program, the Summer School offers a Certificate of Attendance that mentions the workload of 40 hours and ECTS credits: 1.5. Students can apply for recognition of these credits to the relevant authorities in their home institutions, and the final decision on awarding credits is at their discretion.

Format

Morning sessions will involve two interactive one-hour lectures with subsequent discussion starting at 10:00am. Afternoon sessions will involve practical training on cultivation screening methods for nitrification inhibition, amplicon sequencing for microbial community analysis and associated data-driven approaches, along with lectures on associated concepts and handling techniques.

Venue

- [University of Thessaly, Department of Biochemistry and Biotechnology \(DBB\), Biopolis Campus, 41500, Larissa, Greece](#) (Monday 12th and Tuesday 13th of May)
- [University of Thessaly, Paos Monastery, Pelion Greece](#) (Wednesday 14th to Friday 16th of May 2025)

Costs and applying

No registration fee applies. The program covers all lunches and coffee breaks from May 12th to 16th, a social dinner (on the 14th of May), accommodation at Paos Monastery from Tuesday, May 13th to Friday (departure day), May 16th, and transportation from the DBB, Larisa to Paos Monastery in the afternoon of Tuesday, May 13th. The participants will have to cover their travel expenses to Larissa and their accommodation at Larissa (Monday 12th of May).

The Hellenic Society of Mikrobiokosmos will provide travel grants for its members that will attend the summer school. Applicants should mention their affiliation to the Society of Mikrobiokosmos in their application and also inform the Society itself about their application.

The global initiative CropSustain – BNI Wheat Mission will provide 4 travel grants to PhD students (up to 500 euros each) that are willing to attend the summer school. The applicants should state in their application that they apply for the CropSustain travel grants.

To apply, send a CV including a brief description of your current PhD topic and a short motivation statement to actionr@uth.gr, by Friday, 11th April.