

Standard NOVA form for Course plan (preliminary)

Name:	Microbial N transformations and NO/N ₂ O emissions
ECTS:	3
Goals:	To provide in-depth and comprehensive knowledge in the biological aspects of the ongoing nitrogen enrichment of the biosphere, which is one of the most urgent present and future environmental challenges, beyond that of global warming. To give students experience in some relevant traditional and cutting-edge technologies
Pre-required knowledge:	The course aims at PhD students working within the areas Micobial Ecology/Environmental Microbiology or Soil Chemistry, or adjacent fields. All students should have basic course level knowledge in chemistry.
Examination elements:	Students shall write a report on the results obtained during the experimental work. It should be written as a scientific report, and contain references to relevant scientific literature.
Deadline for after course examination or report:	2 months (including summer vacation)
Pedagogical approach:	The experimental part of the course will be performed as a “realistic” scientific piece of work. Students will work in groups to analyse an ongoing field experiment with respect to gas emission (flux field measurements and laboratory gas kinetics), soil chemistry and microbial communities/gene pools. The compiled results will be discussed at colloquia. Lectures will be given to provide in-depth knowledge and “latest news” from topics directly related to the experiments. There will also be lectures that cover related scientific topics. Seminars will be arranged where students and teachers will pinpoint the most urgent problems related to nitrogen enrichment of the biosphere, and make a plan “what can be done”. Further, all students will give short presentations of their own research work, to become acquainted but also to practice oral presentation.
Scientific content:	Biogeochemical processes involved in nitrogen transformations
Added value from non-NOVA teacher(s)	The non-NOVA teachers
Motivate if the number of teachers exceeds 10:	We will have a staff of about 10 researchers from our own university who will take part in the course, and be responsible for the experimental parts. We plan to invite 10 teachers from outside UMB, all but one from Nordic countries. The invited teachers all represent strong expertise in areas that are highly relevant for the course, and complementary to the competence at our own university. They will give lectures on their own research and

	<p>participate at seminars and discussions. This entire team of teachers will all contribute to an up-to date picture of the latest research achievements and future challenges concerning the biological aspects of the ongoing nitrogen enrichment of the biosphere, which is one of the most urgent present and future environmental challenges.</p>
<p>Network members:</p> <ul style="list-style-type: none"> • Names • Titles • Assignments 	<p>Åsa Frostegård, professor, main teacher and head applicant, UMB Lars Bakken, main teacher, UMB Jan Mulder, main teacher, UMB Lars Egil Haugen, associate professor, other teacher, UMB Trond Børresen, professor, other teacher, UMB Endalkachew Wolde-meskel, PhD, other teacher, UMB Peter Dörsch, PhD, other teacher, UMB Binbin Liu, PhD, other teacher, UMB Kristina Lindström, professor, other teacher, HU-AF Sara Hallin, Associate professor, other teacher, SLU Ole Nybroe, professor, other teacher, LIFE Anders Priemé, associate professor, other teacher, LIFE Jan Sørensen, professor, other teacher, LIFE</p>
<p>Other teachers:</p> <ul style="list-style-type: none"> • Names • Titles • Assignments • Qualifications 	<p>Audun Korsæth, PhD, researcher at Norwegian Institute for Agricultural and Environmental Research. Expertise: Modelling nitrogen dynamics in agroecosystems, use of the sensor EM38 for mapping soil variation, reflection analyses for site specific fertilizer application, remote sensing, yield estimation. Responsible for field experiment that the course will visit.</p> <p>Leif Klemetson, professor at Univ of Gothenburg, Sweden. Expert on nitrous oxide emissions, global change.</p> <p>Laurent Philippot, professor at INRA, Dijon, France. Guest researcher at SLU, Sweden. Expert on molecular biology and ecology of denitrifying bacteria.</p> <p>Pertti Martikainen, professor at Univ of Kuopio, Finland. Expert on greenhouse gas dynamics</p> <p>Jørgen Olesen, research professor at Reseach Center Foulum, Denmark; Expert on greenhouse gas emissions and mathematical modelling of the plant-soil-atmosphere system</p>
<p>Nordic dimension:</p>	<p>Nitrogen enrichment of the biosphere is of great concern in the Nordic countries, and the suggested topic has high scientific and political/environmental relevance for our countries . Moreover, many of our PhD students may have future missions in other countries and should have knowledge on these issues also on a more global scale. We</p>

	<p>have suggested a team of teachers mainly from the Nordic countries who, together, represent a very strong and internationally well-known expertise in microbial ecology/soil science/molecular biology/mathematical modelling, and we believe that we thus cover all of the essential aspects of the major themes of the course. It will give a very good opportunity for PhD students and researchers to meet and exchange experiences and knowledge, and it will hopefully serve as a starting point for collaborative research projects.</p>
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Definitions

Head applicant	Responsible for the application, must be a scientific staff member at one of the NOVA member institutions
Course leader	CV is mandatory, must have a doctoral degree (often also head applicant)
Main teacher(s)	Teacher(s) giving a substantial amount of lectures or tutoring. <u>Must be entered in the database, with CV.</u>
Other teachers	Teachers with less amount of lecturing or tutoring