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SHORT INTENSIVE COURSES

Before and during the internship students will be trained on the specific topics / methodologies related to the internship programme by "short intensive courses" organised by the hosting institution and online courses provided by the TAURUS consortium.

Course title: Fundamental concept of biogeochemical cycling
Linked to the Internship programme: Biogeochemical Cycles at the Interface of Urban-Rural Systems
Edition: 2020
Academic coordinator: Prof. Michaela Dippold
Duration: 7 working days (50 h)

GENERAL OBJECTIVES

-Biogeochemical cycles (C, N, P)
-Current research topics in biogeochemical research, focused on soil biogeochemistry
-Lab methods in soil biogeochemical research

COURSE STRUCTURE

General introduction:
The short intensive course is tailored to give students an overview on current cutting-edge research in soil biogeochemistry. The first module provides basic knowledge about the most important global element cycles. It designed as an online course and accessible via "Slideshare". Module 2 introduces a current research topic and gives ideas on how to approach it in a scientific manner. Students will prepare a short presentation and address a scientific question in a professional way. In module three the students learn which methods are available in the lab and apply them on a "real world" problem. A focus will be on applications for radio- and stable isotope methods.

Module 1: Short intensive keynote lectures on C-, N-, P-element cycles
Lecturers
Michaela Dippold
Affiliation: University of Goettingen, Biogeochemistry of Agroecosystems, Germany
Work area: Soil biogeochemistry
Education: Diploma in Geoecology, PhD in Natural Sciences

Callum Banfield
Affiliation: University of Goettingen, Biogeochemistry of Agroecosystems, Germany
Work area: Soil biogeochemistry
Education: Diploma in Geoecology, PhD in Natural Sciences (soil science)

Moritz Koester
Affiliation: University of Goettingen, Biogeochemistry of Agroecosystems, Germany
Work area: Soil biogeochemistry
Education: BEng in Applied Physics, MSc in Biogeosciences

Module 2: State-of-the-Art of Biogeochemical Research
Lecturers: see module 1

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Module 3: Lab Methods at the Interface of Urban-Rural Systems
Lecturesr: see module 1

EXPECTED LEARNING OUTCOMES

Practical and technical skills

- On-hand laboratory experience for soils, plants, sediments, gas samples
- Radio- and stable isotope handling including safety procedures
- Analysis of samples on a wide range of instrumentation (GC, LC, photometer, C/N analyzers, scintillation counter)

Professional skills

- biogeochemical element cycles
- scientific presentation skills
- communicating science
- applications for radio- and stable isotopes in environmental research

TEACHING METHOD

The course is structured on a total of **3*6 h** for the web-based training (module1) and **14 h** (including preparation time) for the presentations in module 2. Additional **3*6 h** hours will be devoted to the demonstration of laboratory methods. This makes a total of **50 h** for this short intensive course.

ASSESSMENT

The assessment will be based on the evaluation of short written answers to programme related questions.

Suggested literature

Modern Soil Microbiology, Third Edition (English Edition). von van Elsas, Jan Dirk, Jack T. Trevors, et al. 2019.

The Microbial Regulation of Global Biogeochemical Cycles. Johannes Rousk, Per Bengtson. Frontier Research Topics. October 2014.

Ciais, P., C. Sabine, G. Bala, L. Bopp, V. Brovkin, J. Canadell, A. Chhabra, R. DeFries, J. Galloway, M. Heimann, C. Jones, C. Le Quéré, R.B. Myneni, S. Piao and P. Thornton, 2013: Carbon and Other Biogeochemical Cycles. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.