PhD course on

Emerging Contaminants in Urban Waters: Sampling, Analysis, Data Treatment Interpretation and Environmental Protection Solutions

(3-5 ECTS)

Date: 10 to 12 December 2024 (09:00-16:00) (Module 2)

Place: University of Oulu, Linnanmaa Campus, Oulu – Finland

Registration: https://link.webropolsurveys.com/S/9FEE73BBD88A9F3C

The course consists of 3 Modules as follows:

Module 1: This is the starting module of the course, and activities include the pre-reading of provided materials (scientific publications on specific topics such as what micropollutants are and why the concern, occurrence in the natural environment, monitoring and analysis requirements and challenges, etc.) and small assignments to be completed before the start of Module 2. Moodle teaching environment will be used, and the participants will complete all tasks independently.

Module 2: This is the active (student interactions) module of the course with defined scheduled lectures and activities. Activities will include face-to-face sections. Lecturers from outside Finland might provide presentations using video conference tools and students might also attend the sections online (although the focus will be placed on presential activities). Activities (lectures and hands-on individual and group activities such as data analysis and results interpretation) will be allocated over 3-full days. Students will be required to attend the activities and submit a learning diary/critique essay in the subsequent week. Students can also opt to present their research topic (relevant to the course content) in the planned seminar section.

Module 3: This module includes post-course activities for learning consolidation, and it is an optional module. Participation in Modules 1 and 2 will provide 3 ECTs while a further 2 ECTs will be awarded for the completion of Module 3. The module will include site visits (13/12/2024) to water and wastewater treatment plants in Oulu where the site engineers will describe the processes and monitoring efforts aimed at micropollutant assessment and removal. Students who participate in the visit and return a "visit diary" will receive 1 ECT. 1-2 further credits will be awarded for the independent completion of specific assignments focusing on e.g., source identification and load estimation, data analysis and interpretation as well as on understanding the effect of substances' properties on their mobility, impact and contaminant retention.

Lecturers: Confirmed lecturers include

Research Specialist Dr. Noora Perkola, Finnish Environment Institute (SYKE), Finland
Dr. Lina Büngener University of Oulu, Finland
Assoc. Prof. Pedro Carvalho. Aarhus University, Aarhus, Denmark
Assoc. Prof. Dr Jannis Wenk, University of Bath, England.
Senior Ministerial Adviser, Ari Kangas, Ministry of the Environment, Finland
Senior Research Fellow Elisangela Heiderscheidt, University of Oulu, Finland
Senior Research Fellow Heini Postila, *University of Oulu, Finland*

Module 2

Section 1: Overview, detection and occurrence

- ✓ Introduction to the course and the topic: What are micropollutants and why are we concerned? Occurrence in the environment.
- ✓ Trace organics detection techniques 1 - Analysis methods for different matrices
- ✓ Trace organics detection techniques 2- Sampling and analytical challenges and developments
- ✓ Microplastic detection methods and challenges
- ✓ Introduction to antimicrobial resistance (AMR) and investigation methods
- ✓ Municipal wastewater as a source of AMR and possible impacts on urban water bodies.

Section 2: Sources and contaminant reduction technologies

- ✓ Seminar: Students and external researchers' presentations and panel discussion
- ✓ Sources of micropollutants to urban waterbodies (stormwater, municipal wastewater, etc.)
- ✓ Removal of micropollutants at wastewater treatment plants and green infrastructures (NBS)

Section 3: Regulations, environmental load and impact prediction

- ✓ Source identification and load prediction
- ✓ In-class assignment: Source identification and load prediction
- ✓ Impact assessment: Toxicology and risk assessment
- ✓ Revised EU Urban Wastewater Directive

Contacts

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