

The Microbial Ecology & Water Engineering Component in Environmental Engineering Education

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Organizers

David Weissbrodt (*present on site*) is an Assistant Professor at the TU Delft, Netherlands. He leads the Weissbrodt Group for Environmental Life Science Engineering within the Environmental Biotechnology Section of the Department of Biotechnology. He teaches in the Life Science & Technology and Civil Engineering & Geoscience programs. He was awarded by the student association for one of the Best Teacher Awards of the Year 2018 of the Environmental Engineering track. He organized the IWA Biofilms: Granular Sludge Conference 2018 in Delft. David is member of management committees of IWA specialist groups on Microbial Ecology & Water Engineering (MEWE) and Environmental Engineering Education (E3).

Eberhard Morgenroth is a Full Professor of Process Engineering in Urban Water Management at ETH Zürich and Head of the Department of Process Engineering at Eawag, Switzerland. He directs the Program of Environmental Engineering at ETH. Eberhard leads the IWA SG Biofilms and led the IWA SG E3 from 2000-2006.

Nancy Love (*present on site*) is the Borchardt and Glysson Collegiate Professor of the Department of Civil and Environmental Engineering at the University of Michigan, USA. She heads the Love Research Group as principal investigator of the Environmental Biotechnology Group. Nancy led the IWA SG E3 over the last five years.

Description on topics of the workshop

Environmental Engineering Education (E3) is an essential component for the qualification of new-generation and leading professionals of the water science and engineering sector. The field is moving forward with new incentives for, *e.g.*, circular blue economy, water resource recovery, sewer and plant-wide modelling, systems microbiology, big data and digitalization among others leading topics for an enhanced understanding, design, and management of the water cycle, protection of water resources, public health, and environmental systems. The profession is becoming always more integrative, while disciplines become always more specialized. The new waves of thinking processes and methods foster the reappraisal of educational programs across institutional, regional, and international scales. The advent of digital education propels access to knowledge remotely across regions.

Within such dynamic and fast-growing development processes, the E3 Specialist Group seeks to revive its actions within the International Water Association (IWA), aiming for the establishment of an active community stimulating an international peer learning. In a first step, we aim to identify areas for which specific actions will have to be developed in the next five years as a basis for long-term interaction. We therefore aim to reach out specialist groups of the IWA network to actively handled their most important prerogatives relating to education.

The field of Microbial Ecology & Water Engineering (MEWE) has experienced a tremendous development over the last decade. Since early foundations in populations dynamics of activated sludge and early calls for the reunion of microbial ecology and environmental biotechnology, disciplines have laterally evolved toward, *e.g.*, ecogenomics & systems biology and integrated urban water management & process engineering, respectively, with the advent of new-generation wet-lab and dry-lab workflows.

At the educational level, initiatives need to get shaped to re-integrate these novel concepts and methods in skillsets of the future generation of professionals. It becomes essential for instance to identify whether such translation should be directed into existing or new curricula along disciplinary and/or interdisciplinary approaches.

Overall, with the field of microbial ecology rapidly developing there is a need to actively pursue education and learning for stakeholders relevant in microbial systems, from treatment plant operators to engineers to modellers. With this workshop, we aim to bridge with the MEWE delegates to analyse the state of the situation of the MEWE component in education, to identify prerogatives, and develop a roadmap toward their integration into the E3 initiative.

Program and schedule: Sunday, November 17, 2019, 09:00-12:00

09:00	Workshop opening David Weissbrodt & Nancy Love
09:00-09:15	<i>Participants roundtable</i> Research field, interest, expectation
09:15	Introductory session
09:15-09:30	<i>The IWA SG on Environmental Engineering Education</i> Nancy Love
09:30-09:45	<i>Reviving incentives on Education at IWA: perspectives for MEWE</i> David Weissbrodt
09:45-10:00	Follow-up discussion
10:00	Coffee break (15')
10:15	Break-out groups session #1 Moderators: David Weissbrodt & Nancy Love
10:15-10:30	<i>The role of IWA in environmental and water engineering education</i> Aim: Groups of 7-10 persons discuss and highlight the core duties of IWA to foster education on environmental and water engineering at the international level. A specific accent is put on objectives, ways, and in which form IWA should propel education targets.
10:30-11:00	Integration session #1 Groups of delegates present and debate their outputs with the broader audience.
11:00	Coffee break (15')
11:15	Break-out groups session #2 Moderators: David Weissbrodt & Nancy Love
11:15-11:30	<i>The MEWE component in environmental engineering and education programs</i> Aim: Groups of 7-10 persons expose to which extent and how the microbial ecology and water engineering topics are included and taught at their home institutions. They highlight how a better integration can be achieved, and how E3 and MEWE can contribute to this.
11:30-12:00	Integration session #2, synthesis, and roadmap Groups of delegates present and debate their outputs with the broader audience.
12:00	Workshop closure David Weissbrodt & Nancy Love