



Online Biomonitoring and *In Situ* Bioassays

25 October 2022

Hybrid course



Aim of the course

This course aims to provide an overview on the application of online biomonitoring and *in situ* bioassays to monitor the quality of water, soil and sediments.

Course description

Online biomonitoring is applied to evaluate water quality with high time resolution using aquatic organisms as indicators and therefore allowing to capture patterns of peak events. To date, the method has mainly been established for drinking water and surface water assessment; the application to wastewater is currently being explored. *In situ* bioassays, exposing organisms directly in their natural environment e.g. in cages, have been established for different environmental compartments, such as water, sediment and soil.

An overview of both methods will be followed by presentations of selected case studies for different environmental matrices and compartments. In addition, future research needs and perspectives for the application of online biomonitoring and *in situ* bioassays in regulation will be discussed.

Tuesday, 25 October 2022

- 08:30 Welcome Coffee
- 09:00 General introduction to the topic + first exchange
Benoît Ferrari & Cornelia Kienle, Ecotox Centre
- Part 1 Online Biomonitoring**
- 09:20 Overview on online biomonitoring
Cornelia Kienle
- 09:30 Real-time and *in situ* monitoring of aquatic environments using indigenous microbial community-based biosensors
Jean-Michel Monier
- 09:50 Online biomonitoring with algae and water flea
Florian Schulz
- 10:10 Online biomonitoring of diffuse pollution in a small Swiss river using aquatic invertebrates
Miriam Langer
- 10:30 Coffee Break
- 11:00 ToxMate: Station to evaluate the increase of chemical contaminant load in aqueous matrices by analyzing the movement behavior of calibrated aquatic invertebrates under controlled conditions.
Alexandre Decamps
- 11:20 Online biomonitoring at wastewater treatment plants
Ali Kizgin
- 11:40 RAINBOWflowCHIPonline: A fish cell-based impedance sensor to monitor water quality
Jenny Maner
- 12:00 Discussion rooms
- 12:30 Lunch Break

Part 2 *In Situ* Bioassays

- 13:30 Overview on *in situ* bioassays
Benoît Ferrari
- 13:40 The PICT concept: *In situ* bioassays with aquatic primary
producers in frame of EcolImpact
Louis Carles
- 14:00 Active biomonitoring with caged benthic amphipods
Arnaud Chaumot
- 14:20 *In situ* bioassays with fish
Rita Triebkorn
- 14:40 Coffee Break
- 15:10 Case study on *in situ* bioassays with sediment organisms
Frédéric Gimbert
- 15:30 Case study on *in situ* bioassays with terrestrial organisms
Annette de Vaufleury
- 15:50 Discussion rooms
- 16:20 Evaluation
- 16:30 Plenary discussion
- 17:00 End of the course & Apero

Target audience

The course is aimed at professionals from industry, authorities and science who are interested in ecotoxicology.

Course participants will receive a certificate of attendance.

The documentation will be available for electronic download before the course. The course language is English.

Course leader

Dr. Cornelia Kienle

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Course organisation

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Course fee

CHF 350.–.

The price includes course fees, documentation, lunch and refreshments during breaks. Not included are overnight stays and other catering.

Registration deadline

Tuesday, 4 October

Online registration under:

www.oekotoxzentrum.ch/expertenservice/weiterbildungsangebot/

Course location

Room C 20

Forum Chriesbach (FC)

Eawag, Überlandstrasse 133, 8600 Dübendorf

or online (link will follow)

The course is organized as a hybrid course. When registering, please indicate whether you prefer to attend on-site or online.

Speakers

Dr. Louis Carles has been working at Eawag as a microbial ecotoxicologist since 2019. He studied environmental microbiology and molecular biology at the University of Pau (France) and got his PhD from the University of Clermont-Ferrand (France) on the biodegradation and toxicity of pesticide mixtures in soil and streams. He is currently working on the impact of micropollutants from wastewater on stream biofilms.

Dr. Arnaud Chaumot has been an aquatic ecotoxicologist at INRAE in Lyon since 2006. He studied biology, ecology and biomathematics at the ENS and the University of Lyon, where he received his PhD in population modelling. At INRAE, he developed *in situ* bioassays with the crustacean species *Gammarus*, both for basic research (population scale effects) and operational application (active biomonitoring).

Alexandre Decamps is Environmental Market Manager for ViewPoint. After a master in Hydrobiology-Ecotoxicology in 2013, Alexandre joined the ecotoxicology laboratory of INRAE-Lyon to develop a biological alert station to determine urban water quality.

Dr. Benoît J.D. Ferrari has been the director of the Ecotox Centre since September 2019. He completed a PhD in ecotoxicology at the University of Lorraine (France). After working as a researcher at INRAE (formerly IRSTEA) in Lyon (France) and at the F.-A. Forel Institute at the University of Geneva, he joined the Ecotox Centre at EPFL in 2013 as head of the Soils and Sediment team.

Dr. Frédéric Gimbert has been associate professor at the University of Franche-Comté (Besançon, France) since 2010. He is specialized in terrestrial and aquatic ecotoxicology at the Chrono-environnement department where he develops *in situ* and *ex situ* bioassays using snails and chironomids as environmental quality bioindicators.

Dr. Cornelia Kienle has been an aquatic ecotoxicologist at the Ecotox Centre since 2008. She studied biology at the Universities of Konstanz and Bremen and received her PhD from the University of Tübingen on the toxicity of environmental chemicals and their mixtures. At the Ecotox Centre, she is mainly involved in evaluating and applying *in vitro* and *in vivo* test systems for monitoring aquatic ecosystems.

Ali Kizgin has been a PhD candidate at ETH since April 2021. He studied ecology at the University of Heidelberg (Germany). His transdisciplinary work on online biomonitoring focuses on the application of online biological early warning systems at wastewater treatment plants for the surveillance of wastewater effluent in cooperation with Eawag, FHNW and the Ecotox Centre.

Prof. Dr. Miriam Langer is the head of the working group Ecotoxicology at the Institute for Copreneurship at the University of Applied Sciences Northwestern Switzerland (FHNW). She studied biology at the University of Tübingen, where she received her doctorate in ecotoxicology. After various positions in industry, research and teaching, including as a course director in an ecotoxicology contract laboratory and as a research associate at the Ecotox Centre, she has been working at the FHNW since 2018.

Jenny Maner has been a PhD student in the Department Environmental Toxicology at Eawag since 2020. She studied biology and environmental sciences at the University of Basel and the ETH Zurich. The topic of her PhD is the application of fish cell lines for *in vitro* chemical toxicity testing and aquatic toxicity testing in the field.

Dr. Jean Michel Monier obtained his PhD in Environmental Science at UC Berkeley (US). After 15 years of academic research in the field of environmental microbiology, he founded Enoveo, a company specializing in environmental biotechnologies, where he developed microbial biosensors for monitoring aquatic environments. In 2019, after the takeover of Enoveo by the Halma group, he joined the group as CTO of the Environmental Department.

Dr. Florian Schulz is employed as support engineer for online toxicity monitors of a German manufacturer of these types of instruments (bbe Moldaenke). He studied biology at the University of Kiel and received his PhD on studies about the ecophysiology of plants in the Antarctic. For about 20 years he has been supporting any kind of online toxicity monitors from the company worldwide, working with daphnia, fish and algae with applications in environmental control, water production and wastewater treatment.

Prof. Dr. Rita Tribskorn is a professor at the Institute of Evolution and Ecology at the University of Tübingen and the head of the Steinbeis Transfer-Center for Ecotoxicology and Ecophysiology

Rottenburg. Her scientific interests are the effects of chemicals and other stressors on invertebrates and fish. She studied and obtained her PhD at the University of Heidelberg, and was subsequently employed at Lonza Werke Visp and at the University of Hohenheim, where she worked on various ecotoxicological issues.

Dr. Annette de Vaufleury has been an associate professor at the University of Franche-Comté since 1998. At the Chrono-environnement Department of Besançon (France), she developed *in situ* and *ex situ* bioassays using terrestrial gastropods.

Directions

Public transport:

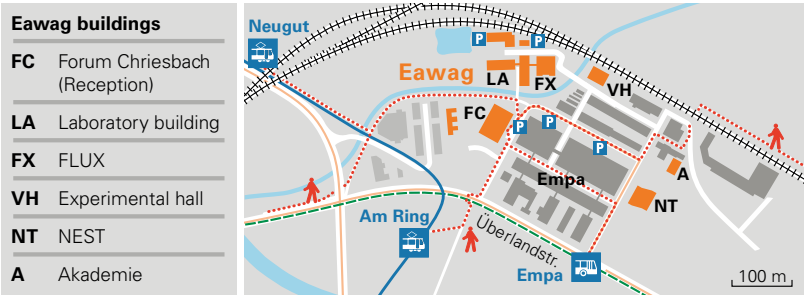
From Zurich Main Station (HB) by S-train (S3, S9, S12) to Stettbach.

From there about 20 minutes walk to Eawag (see map), or by tram No. 12 to "Am Ring" or by bus No. 760 to "Empa".

From Zurich Oerlikon by train S14 to Dübendorf and then by bus No. 760 to "Empa" or walk to Eawag, about 20 minutes.

From Zurich-Airport by tram No. 12 to "Neugut" or "Am Ring" (about 20 minutes driving time).

Car: Motorway A1, exit Dübendorf, to the right towards Dübendorf, 300 meters after the major crossing turn left into the Empa Eawag Campus.



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Picture: Ecotox Centre researchers deploy cages with gammarids in the Eschelisbach to assess its pollution with pesticides.