Modelling in Practice
in Environmental Sciences and Engineering

June 22-23, 2017

Provided by Dynamita in cooperation with

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@EAWAG, Überland Str. 133, 8600 Dübendorf, Switzerland

All topics will include a short introduction and slides helping to explain the key engineering issues. Most of the time will be dedicated to hands-on simulations using the Sumo$^{©}$ simulator for interactive learning.

DAY 1

9.00 – 9.15 Welcome and introductions

9.15 – 9.45 Modelling basics
- Modelling fundamentals and key definitions
- Role and type of models
- Process simulation

9.45 – 10.40 Introduction to Sumo (Hands-on)
- General overview of Sumo as simulation environment
- Sumo tools around a simulation
- Setting up a simple configuration
- How to use Sumo for steady-state and dynamic simulation

10.40 – 11.00 Coffee break

11.00 – 12.30 Kinetics, stoichiometry and pH (Slides and hands-on)
- Basics of modelling the activated sludge process
- ASM family history
- Gujer matrix
- pH and alkalinity estimation

12.30 – 14.00 Lunch

14.00 – 15.30 Influent fractions (Slides and hands-on)
- Wastewater constituents
- Wastewater and biomass fractions

- Role and effect of different fractions in models
- Characterization protocols

- *15.30 – 16.00 Coffee break*

16.00 – 16.30 Nitrification/denitrification/bio-P (Slides)
- Introduction to nitrification and denitrification
- Principle of biological phosphorus removal
- Factors influencing nitrification/denitrification/bio-P

16.30 – 18.00 Nitrification/denitrification/bio-P (Hands-on)
- Extending a BOD plant to nitrify
- Extending a nitrifying plant to denitrify
- Establishing bio-P

DAY 2

9.00 – 10.00 Anaerobic digestion (Slides and hands-on)
- Sludge fermentation and digestion
- Anaerobic process kinetics and pH
- Anaerobic wastewater treatment

10.00 – 10.40 Sidestream treatment (Slides and hands-on)
- Sidestream treatment principles and technologies
- Nitrite shunt
- Anammox
- Bioaugmentation

10.40 – 11.00 Coffee break

11.00 – 11.45 Chemical P removal (Slides and hands-on)
- Principle of chemical phosphorus removal
- Chemicals used
- Impacts of chemical addition on plant operation
- Modelling a chemical P removal system

11.45 – 12.30 Clarifiers / phase separation (Slides and hands-on)
- Settling tank configurations in practice
- Measures of sludge settleability
- Modelling secondary settlers

14.00 – 14.45 Biofilms (Slides and hands-on)
- Biofilm principles and technologies
- Biofilm modelling
- MBBR and IFAS simulation

14.45 – 15.30 Granular sludge – theory, practice and modelling
- Granules and flocs - background
- Granular reactors in practice
- Modelling a granular system

15.30 – 16.00 Coffee break

16.00 – 17.30 Dynamic modelling and DWA guidelines (Slides and demonstration)
- Plant design using DWA
- Comparison with activated sludge models
- Whole plant model capabilities
- Examples

17.30 – 18 Questions, discussion, closing

*Prof. Ekama and Prof. Morgenroth's role is to teach modelling principles - they do not promote one modelling platform over another.