

Advanced Sumo[®] and SumoSlang[®] Course

“Develop, Control, and Simulate”

August 21-22, 2017

Provided by Dynamita

Location: City of Boulder, Colorado

All topics will include a short introduction and slides helping to explain the key engineering and programming concepts. Most of the time will be dedicated to hands-on code development and simulations using the Sumo[®] simulator for interactive learning.

DAY 1

9:00 – 9:15 am Welcome and introductions

9:15 – 9:45 am Sumo[®] structure and model development overview

- General overview of Sumo[®] architecture (GUI, SumoSlang[®] code, XML, C++)
- Model development definitions (components, parameters – stoichiometric/kinetic/equilibrium, state variables, calculated variable, steady state, dynamic, codelocation types, array, rules, functions)
- Accessing files and folder

9:45 – 10:45 am Introduction to SumoSlang[™] (Hands-on)

- Basic overview of SumoSlang[™]
- Model file structure (Sumo1 – overview of different sheets)
- Systemcode (constants, unit conversion, functions)
- Process unit file structure (CSTR with diffused aeration - overview of different sheets)
- Plantwide file structure

10:45 – 11:00 am Coffee break

11:00 am – 12:30 pm Basic model development (Hands on)

- Modifying an existing model (ASM1)
 - o Adding a new component (Colloidal material to ASM1)
 - o Adding a new parameter (maximum flocculation rate, Arrhenius for temperature)
 - o Creating new functions in calculated variable sheet (Contois equation for colloidal material, temperature dependency)

Stop for almost total solar eclipse, <https://www.timeanddate.com/eclipse/in/usa/boulder>,

- o Adding a new reaction (Flocculation reaction - COD, N, and P mass balance check, kinetic rates)
- o Modifying calculated variables (TCOD, TKN)
- o Move to GUI and simulate flocculation.

12:30 – 1:30 pm Lunch

1:30 – 2:30 pm Advanced model development (Slides and hands-on)

- Introduction to pH equilibrium matrix and pH calculation (newton-Raphson)
 - o Adding a new ionic component and species (adding Fluoride to Sumo1)
 - o Adding a new equilibrium reaction (Fluoride as a strong anion)
 - o Testing in GUI
- Alkalinity calculations

- 2:30 – 2:45 pm Coffee break

2:45 – 4:00 pm Introduction to model customization in plantwide file: (Slides and hands on)

- Nomenclature (identifying and writing symbols)
- Simple plantwide example
 - o Controlling internal recycle to optimize nitrate removal

4:00 – 5:00 pm Intermediate level - plantwide introduction and implementation (Slides and hands on)

- if function versus an if block
 - Ammonia Based Aeration Control (ABAC)
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DAY 2

9:00 – 10:40 Model customization (Hands on)

- Add a deflocculation reaction to the modified ASM model developed on Day 1
- Details will be provided during the course

10:40 – 11:00 am Coffee break

11:00 am – 12:30 pm Advanced – plantwide introduction (Slides and hands on)

- Events and PID code
 - o Using PID process unit (mapping) for DO based aeration control
- Arrays and their uses (settlers, biofilms, plug flow reactors)

12:30 – 1:30 pm Lunch

1:30 – 2:30 pm Full plant plantwide code (Demonstration)

- Changing BNR configuration (example from a full-scale bio-P plant)

2:30 – 3:45 pm Under the hood (Slides and hands-on)

- Biofilm modeling basics and implementation
- Layered clarifier model basics and implementation

3:45 – 4:00 pm Coffee break

4:00 – 5:00 pm Questions – answers, discussion, closing