Characterizing human toxicity and ecosystem toxicity with the scientific consensus model USEtox®: Theory, practical application, and new research

PhD Summer School | Course Description

Course objectives

To address the increasing need for methods to assess i**mpacts of toxic chemical emissions on human health and ecosystems**, this course aims at providing a practical overview of multimedia chemical fate modelling, multi-pathway human exposure modelling, ecosystem and human health effects modelling, and comparative indicators for human-toxicological and ecotoxicological impacts. We begin by explaining basic concepts of environmental mass balance modelling - including partitioning coefficients, first order rate coefficients, cross-media transport, and persistence. We next present the fundamentals of multi-pathway models for human intake via inhalation, drinking water and food. We will review hazard-based and risk-based effects modelling approaches that are used to assess effect factors and illustrate how fate, exposure, effect and damage factors can be combined to construct factors to characterize chemical emissions. We then guide the participants through a series of examples in which they will develop characterization factors for human-toxicological and ecotoxicological impacts using the latest release version of the **USEtox scientific consensus model**. Participants will explore USEtox as a tool for comparative assessment of chemical fate, exposure, and effects. We will conclude with several hands-on exercises of how the model can be used in various applications, including the prioritization and ranking of chemicals for institutions like the European Commission or the U.S. Environmental Protection Agency.

Instructors

Instructor will be **Peter Fantke** (USEtox Managing Director) and members of the USEtox team.

USEtox Summer School 2019

Week I

Monday	Tuesday	Wednesday	Thursday	Friday
Reading; individual USEtox pre-defined case study; poster preparation; deliverables: (1) **case solutions**, (2) **posters**				

Week II

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00	introduction *PF*	human intake fraction *RR, PF*	ecotoxicity effects *MH, RR*	near-field exposure *PF, OJ*	participants' cases and feedback (15 min. each) *PF, RR; MH, OJ*
10:00	Context / interpretation *RR, MH*	intake fraction exercises *RR, PF*	ecoexposure and ecotoxicity effect exercises *MH, RR*	near-field exposure exercises *OJ, PF*	
11:00	interpretation exercises *RR; MH*				interpretation/wrap-up *RR, MH*
12:00	lunch	lunch	lunch	lunch	course evaluation *PF, pts*
13:00	two compartment matrix system + fate *OJ, PF*	human toxicity *OJ, PF*	exercises cont'd *MH, RR*	exercises cont'd *OJ, PF*	lunch
14:00		Preparation of own cases + poster session *pts*	Continued work on own cases + poster session *pts*	Continued work on own cases + poster session *pts*	travel home
15:00	two compart. exercise *OJ,PF*				
16:00	full fate matrices *PF, OJ*	human tox exercises *OJ,PF*	Q&A ecotoxicity *MH, RR*	Q&A near-field *PF, OJ*	
17:00	Week I solutions *pts*	data + assumptions *PF, OJ*	Week I solutions *pts*	dynamic fate *PF, OJ*	
18:00		social event		dynamic fate exercise *PF, OJ*	
19:00	come together and dinner		come together and dinner	free evening	
20:00					

Week III

Monday	Tuesday	Wednesday
Finalizing self-defined case; deliverable: (3) **synopsis report**		

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- Home work: case study / report (Week III for PhD students only)
- Lecture / plenary session
- Interactive session / exercises
- Individual case work / posters
- Meals / social events

Deliverables

(1) - one page: solutions of case study
(2) - poster introducing participant with picture, work, and course focus
(3) - two pages of own case results

Instructors

MH	Michael Hauschild
OJ	Olivier Jolliet
PF	Peter Fantke (course responsible)
RR	Ralph Rosenbaum
pts	Participants