Half-day Courses

1. Linking community data and exposure for mesocosms and field investigations

(Leading instructor: Matthias Liess, UFZ Leipzig)

Abstract:

Linking community data and exposure is one of the challenging tasks of environmental risk assessment. For example when using monitoring data for post-registration studies or the interpretation of mesocosm results. The major challenges for this exercise include dealing with (i) confounding factors, (ii) differences in community composition of sample sites and mesocosm replicates and (iii) rare species. The aim of the course is twofold:

1) To inform on the relevant processes that are to be considered when linking community data and exposure.

2) To apply the knowledge obtained using a simple spreadsheet calculator, exercising with real data from mesocosms and field.

Participants will take home a profound knowledge on pitfalls and possibilities in the area of linking community data and exposure. They will also be enabled to independently calculate concentration-response relationships of complex community data. The instructors have 20 years of experience in linking community data and exposure. They have organised the EU SETAC workshop EPiF on effects of pesticides in the field (http://www.systemecology.eu/EPiF/Download.html), and designed the SPEAR indicator system used to identify and predict effects of pesticides in streams (http://www.systemecology.eu/SPEAR/Start.html).

Course objectives:

To provide relevant knowledge on the pitfalls and possibilities in the area of linking community data and exposure. Participants will be enabled to independently calculate concentration-response relationships of complex community data.

Course level:

Intermediate

2. Use of QSAR in risk assessment: practical use of the VEGA models

(Leading instructor: Elena Boriani, Aarhus University)

Abstract:

The EC funded projects ORCHESTRA and ANTARES are checking and promoting the safe use of predictive models for (eco)toxicity evaluation. A new platform offering a collection of these predictive models, also called QSAR, is now available at the web site http://www.vega-qsar.eu. The QSAR models include models developed by US EPA and by the CAESAR project. This course provides a specific practical overview of these QSAR models, but also regarding QSAR models and predictive software in general. Exercises will be done and participants will be trained on the use and evaluation of QSAR and read across. Particular attention will be given to the issue of the applicability domain and on how to interpret and use the QSAR results. For this, VEGA includes tools for read across, to be used combined with QSAR predictions, to optimise the reliability of the results. The course will be mainly practical, addressing the typical errors which can occur with these methods, and how to avoid them, in order to have safer results. This course is strongly recommended to understand the meaning of QSAR model results and to critically and correctly interpret them in the context of chemical safety for risk assessment purposes.

Course Objectives:

The course will provide examples and guidance on the practical use of particular QSAR, for assessing chemical properties and toxicity data for compounds. VEGA platform models will be tested and results will be critically discussed. The course is aiming to teach recommended practices to deal with QSAR methods in a critical way. Participants will learn how to use QSAR models, what can be obtained and what it cannot. After the course students will be able to perform their own calculations using the user friendly, freely available VEGA platform models. They will also be able to interpret the obtained results.

Course level:

Introductory

3. The Endocrine System: The Good, The Bad, and The Regulations

(Leading instructor: Ellen Mihaich, ER2)

Abstract:

In response to the concern that certain environmental chemicals could be interfering with the endocrine system of humans and wildlife, regulations have been promulgated in various regulatory bodies around the world to target the evaluation of these types of effects. The purpose of this short-course is to address key topics related to endocrine system evaluation and regulatory requirements around the world. The course will provide basic information on the vertebrate endocrine system, mechanisms of control, and adverse effects. The focus of the endocrine system presentation will be the estrogen, androgen, and thyroid systems. The requirements of the US EPA's Endocrine Disruptor Screening Program as well as those for REACH and other regulatory initiatives will be reviewed and the specific screens and tests will be discussed. A quantitative Weight of Evidence approach will be presented and considered with respect to risk assessment objectives. Finally, a simulation game, called EndoChallenge, will be staged where small groups of participants can engage in the activities required by the Endocrine Disruptor Screening Program, many of which are OECD guideline studies, which will reinforce the use of the various screens in a global regulatory context.

Course objectives:

To provide a basic knowledge of the functioning and interactions of the endocrine system in mammals, birds, and aquatic organisms, the review requirements of regulatory programs around the world including REACH and the US Endocrine Disruptor Screening Program (EDSP), and to apply the concepts discussed using an interactive simulation game based on the activities required by the US EDSP and other regulatory authorities.

Course level:

Introductory

4. Evolution and Practical Application of Ecosystem Services in Environmental Decision Making

(Leading instructor: Joe Nicolette, ENVIRON)

Abstract:

Using case studies, this course will explore how valuation of ecosystem services can be used for real world decision making to the benefit of the environment and human wellbeing. The goal of this workshop is to provide an overview of: 1) the evolving "ecosystem services" field, 2) resource economics methods to quantify ecosystem services, 3) applications where ecosystem services can be incorporated into decision-making including case studies, and 4) provide for an interactive discussion.

In making decisions regarding potential environmental impacts associated with actions that can affect the environment, stakeholders must be able to balance the risks, benefits, and tradeoffs associated with a variety of alternative actions. Whilst the underpinning science and practical tools are still evolving, we provide potential approaches that can be used to formally quantify the effect of potential actions on ecosystem services, . This course aims to show how tangible metrics can describe the costs or benefits associated with actions that affect the environment. These approaches include overarching net ecosystem service analysis (NESA) and net environmental benefit analysis (NEBA) approaches. Delegates will learn how ecosystem services concepts link to regulatory drivers, and the strengths and weaknesses of different tools and approaches, using case study applications.

Course objectives:

1. Provide overview of ecosystem services : definition and evolution
2. The resource economics of ecosystem services. Provide an overview of ecosystem service quantification and valuation
3. Where should we be heading? Review the goals of a wide range of regulatory programmes
4. Discuss practical applications of ecosystem services in environmental decision-making frameworks (E.U. and U.S. applications): environmental damage [Environmental Liabilities Directive (ELD)], sustainable remediation, International Finance Corporation Performance Standards, environmental impact analysis, restoration and mitigation, Integrated Coastal Zone Management, fisheries and landscape management and Plant Protection Products Registration decision frameworks
5. Provide case study presentations includingdiscussion of nNet ecosystem service analysis (NESA) and net environmental benefit analysis (NEBA)
6. Interactively discuss potential barriers to incorporating ecosystem services into environmental decision-making

Course level:

Intermediate

5. Scientific Communication - Improving your science communication skills

(Leading instructor: Aroha Miller, Stockholm Natural History Museum)

Abstract:

Communicating your research is a fundamental skill for working in science. Many people underestimate the role good writing skills play in a scientist's career. From writing the first PhD proposal, or protocols for laboratory procedures, publishing articles in peer reviewed journals and writing client reports, applying for funding or sharing your research with the public, good scientific communication skills are essential throughout the entire scope of a science career. Here, we offer a short workshop to increase knowledge and skills for dealing with some common scientific documents, including how to correctly structure an abstract and manuscript, the importance of reviewing, how to prepare a good oral presentation, and common writing mistakes seen in science. This course is aimed at PhD students, or very early career scientists with little science communication experience.

Course objectives:

Students of this course should gain:

1) knowledge of how to structure and write abstracts and manuscripts;
2) an ability to recognise common mistakes made in writing;
3) an understanding of the importance of reviewing;
4) knowledge of how to prepare oral presentations.

Course level:

Introductory

6. Handling regionalisation at the global scale in life cycle impact assesment: Impact World + methodology

(Leading instructor: Cecile Bulle, Ecole Polytechnique de Montreal)

Abstract:

- Most of the impacts modelled in life cycle impact assessment (LCIA) are regional or local impacts. However, LCIA methodologies currently offer generic characterization factors (CFs), not allowing to account for the spatial variability of impacts. Some LCIA methodologies have partially addressed regionalisation (IMPACT 2002+, ReCiPe, LIME, or LUCAS), but all only cover a restricted region of the world. When caracterizing a life cycle inventory over a global economy with e.g. a european LCIA methodology, it implies the underlying assumption that all the emissions occur within the reference region of that methodology, e.g. in Europe, which is not necessarily a better assumption than applying global or generic CFs.
- This short course aim to provide an overview how to address regionalisation when assessing global scale life cycle inventories. This short course is strongly based on the outcomes from the development of IMPACT World + globally regionalised LCIA method. The following elements will be treated during the course:
- Modeling spatially differentiated characterisation factors (CFs);
- Chosing the most relevant geographical scale per impact category (toxic impacts, eutrophication, acidification, respiratory impacts, water use, land use);
- Archetypes vs. geo-referenced approach;
- Weighting based aggregation upon current geographical emission distribution or emission proxis to lower resolution scale: country, sub-continent or global generic;
- Determine uncertainty and variability of characterization factors;
- Examples of application and interpretation: how to apply spatially differentiated CFs for a practitionner

Course objectives:

The participant will be able to:

- understand the midpoint-damage framework
- understand the major limitations of current LCIA methodologies regarding regionalization
- understand how spatially differentiated or archetype-based CFs are calculated
- correctly interprete the relevance and the uncertainty associated with regional CFs
- perform a LCIA addressing regionalization of available LCI

Course level:

Introductory

7. Characterisation of nanoparticles in the framework of ecotoxicological studies

(Leading instructor: Charles Clifford, National Physical Laboratory)

Abstract:

Nanomaterials ecotoxicology is an interdisciplinary field of growing importance given the rapid rise in commercial products which contain nanomaterials. Scientists involved in this field need to master a wide spectrum of knowledge and techniques, which often extends beyond their professional background.Robust methodologies for the physico-chemical characterisation of nanomaterials in environmentally-relevant media is of paramount importance to understand interactions between these materials, the environments and living organisms. This course provides scientists with an overview of methodologies for the physico-chemical characterisation of nanomaterials in the framework of eco-toxicological studies. It is addressed to scientists without extensive background in this area, as well as those wishing to enlarge their knowledge of nanomaterials characterisation. This course also aims at encouraging the development of standardised robust methodologies and is therefore of interest to scientists already active in the field.The course will be given by scientists from the UK National Physical Laboratory (NPL) and their collaborators. NPL is the UK's National Measurement Institute, with international reputation in the field of materials characterization. NPL leads and participates in a portfolio of European and international research projects on nanomaterials eco-toxicology.

Course objectives:

This course aims at providing scientists with:

- A clear definition and understanding of the properties of nanomaterials under investigation in eco-toxicological studies. Properties include: size, size distribution, composition, aggregation, dissolution and sedimentation behaviour, concentration, surface charge and surface chemistry.
- An overview of the range of techniques available to characterise the parameters listed above.
- An overview of the best-practice methodologies utilized to prepare the samples.
- An overview of the international research, standardisation and regulatory activities in the field, completed by a list of references and contact details for programme managers, research institutions and companies active in this area.

Course level:

Introductory

8. Introduction to compound specific isotope analysis (CSIA) to assess the origin and the fate of organic contaminants in groundwater

(Leading instructor: Daniel Bouchard, University of Neuchatel)

Abstract:

Over the last three decades, compound-specific isotope analysis (CSIA) has evolved from the state of laboratory studies to a highly sensitive field assessment tool. Owing to this intense development, the method has become cost effective and is increasingly used to gain key information on released organic compounds in the environment that common concentration measurements cannot reveal. This tool has proven its reliability and robustness to demonstrate biodegradation of organic compounds in groundwater, and to differentiate sources of contaminant on a same site. Assessments using this tool have been carried out on numerous sites contaminated with volatile organic compounds (VOC), such as petroleum hydrocarbons and chlorinated solvents. Moreover, the increasing number of academic and commercial laboratories offering the analysis in addition to the recent release of an application Guideline attest the growing interest in this assessment tool.

The application of the CSIA method in the frame of a natural attenuation remedial strategy provides several direct benefits. The CSIA method greatly enhances the quality of information derived from the data set collected over time, strengthens the conclusions drawn on the fate of organic contaminants in groundwater, and reinforces the Regulator's decision to approve on-site application of the natural attenuation remedial strategy.

Course objectives:

This short course aims to explain the fundamentals of the CSIA method, to describe state-of-the-heart applications, to depict field implementation strategies for a successful CSIA assessment and to expose all type of information that can be obtained during a field site assessment.

This introductory course is intended for regulators, contaminated site owners, field practitioners, private consultants and young scientists.

Selected references:

- Environmental Isotopes in Biodegradation and Bioremediation. Aelion, M.C., Aravena, R., Höhener, P., Hunkeler D. Tailor and Francis publishers. CRC Press. Boca Raton. 2009.

- A Guide for Assessing Biodegradation and Source Identification of Organic Ground Water Contaminants using Compound Specific Isotope Analysis (CSIA). EPA 600/R-08/148 | December 2008 | www.epa.gov/ada

Course level:

Introductory

9. Passive dosing of hydrophobic organic chemicals - improved experimental control of freely dissolved concentrations in toxicity, bioconcentration and binding studies

(Leading instructor: Philipp Mayer, Aarhus University)

Abstract:

Freely dissolved concentrations (or chemical activities) of hydrophobic organic chemicals (HOCs) are important for bioconcentration and toxicity, sorption and biotransformation. However, the hydrophobicity of HOCs makes it challenging to initially dissolve them and then to maintain stable concentrations against sorptive and evaporative losses. Typically HOCs are introduced by co-solvent spiking, leading to poorly defined and often decreasing exposure concentrations. This is particularly problematic for mixtures, where analyte specific decreases can lead to changes in the mixture composition. Therefore, new dosing approaches are required to ensure defined and constant dissolved concentrations in experimental systems. These should: provide defined and stable dissolved concentrations, eliminate co-solvent effects, avoid physical effects of non-dissolved test substance and simplify analytical confirmation. Here passive dosing has an important role to play. In passive dosing, a biocompatible polymer loaded with test compound acts as a partitioning source, compensating for losses to give defined and stable dissolved concentrations. These can be independently controlled for each substance at or below aqueous solubility. Its flexibility means passive dosing can be applied in experimental systems ranging from microtiter plates up to aquariums.

This course will cover the principles and correct application of passive dosing for the control of single and mixture HOC dissolved concentrations (and chemical activities) in experimental systems for studying toxicity, bioconcentration, binding and biotransformation.

Course objectives:

The objectives of this short course are to:

- Cover the principles, formats and correct application of passive dosing
- Apply case studies to illustrate the utility for measuring HOC toxicity, bioconcentration and speciation/binding.
- Provide a practical session to show the range of passive dosing formats, illustrate the preparation of selected formats and provide an opportunity to dicsuss with the course participants their specific requirements

Course level:

Intermediate