

2015 Society for Risk Analysis Annual Meeting Continuing Education Workshops

Workshops are offered Sunday and Thursday, either Full Day, a.m. Half-Day, or p.m. Half Day. Full descriptions of each workshop are provided below. **PLEASE NOTE: Workshops that do not meet the minimum number of required registrations will be cancelled on November 1, 2015.**

Workshop #	Workshop Title	Day/Time	Cost
WK2S	Cumulative Risk Assessment: Addressing Combined Environmental Stressors	Sunday, December 6 th 8:30AM-5:30PM	\$350
WK4S/11S	Fundamentals of the Risk Assessment Paradigm, From Hazard Characterization to Risk Communication, with an Emphasis on Contaminated Sites	Sunday, December 6 th 8:30AM-5:30PM	\$325
WK5S	Monte Carlo simulation and probability bounds analysis in R with hardly any data	Sunday, December 6 th 8:30AM-5:30PM	\$270
WK6S	Categorical Regression Modeling	Sunday, December 6 th 8:30AM-5:30PM	\$300
WK7S	Integrating Strategic Risk Communication with Risk Management to Enhance Organizational and Behavioral Change	Sunday, December 6 th 8:30AM-5:30PM	\$450
WK8S	Eliciting Judgments from Experts and Non-experts to Inform Decision-making	Sunday, December 6 th 8:00AM-12:00PM	\$250
WK10S	Regional scale ecological risk assessment with Bayesian networks	Sunday, December 6 th 1:00PM-5:00PM	\$300
WK12S	Methods for Quantifying and Valuing Population Health Impacts	Sunday, December 6 th 1:00PM-5:00PM	\$275
WK13T	Monte Carlo simulation and probability bounds analysis in R with hardly any data	Thursday, December 10 th , 8:30-5:30	\$270
WK14T	Chemical Mixtures Health Risk Assessment of Environmental Contaminants: Concepts, Methods, Applications	Thursday, December 10 th , 8:30AM-12:00PM	\$125
WK15T	Developments in Risk Assessment: State of the Science for Evaluating Toxicity Data for Human Health Risk Assessment	Thursday, December 10 th , 8:30AM-12:00PM	\$225

FULL DAY WORKSHOPS – SUNDAY December 6th, 8:30AM-5:30PM

WK2S: Cumulative Risk Assessment: Addressing Combined Environmental Stressors

Cost: \$350

Instructor(s): Linda K. Teuschler, LK Teuschler & Associates; Rick Hertzberg, Biomathematics Consulting; Margaret MacDonell, Argonne National Laboratory; Moiz Mumtaz, ATSDR; Jane Ellen Simmons, USEPA; Amanda M. Evans, Association of Schools of Public Health Research Fellow; Michael Wright, USEPA; Glenn E. Rice, USEPA

Description: Cumulative risk assessment (CRA) addresses the impacts of multiple chemical and nonchemical stressors on real world individuals and communities, resulting in complex exposures for individuals and populations with a variety of vulnerabilities, in applications that range from environmental justice and community sustainability to individual health promotion and protection. Nonchemical stressors include biological and physical agents (e.g., microbes and noise) as well as socioeconomic stressors and psychosocial conditions (e.g., associated with natural disasters). Public concerns that can initiate CRAs include (1) elevated environmental measurements or biomonitoring data; (2) multiple sources of pollutants or stressors; and (3) changes in disease rates or patterns (e.g., leukemia cluster) or ecological effects (e.g., loss of wildlife diversity). This workshop focuses on human health and begins with an overview of three CRA elements: analysis, characterization, and quantification (as feasible) of the combined risks from multiple stressors. Teaching methods include lectures and hands-on exercises. Presentations highlight basic concepts, methods, and resources for conducting a population-based CRA. A central theme is integrating exposure and dose-response information with population characteristics during planning and scoping based on initiating factors. Vulnerability factors are addressed, e.g., diet/nutritional status, behaviors, genetic traits, socioeconomic status, sensitivities, and psychosocial stress. Methods for estimating human health risks are discussed and applied, including epidemiologic approaches and assessing the joint toxicity of chemical mixtures. In the exercises, participants develop chemical, biological and physical stressor groups using exposure and toxicity factors, link them with population vulnerability factors and conduct a risk characterization. Participants are asked to bring a calculator.

WK4S: Fundamentals of the Risk Assessment Paradigm, From Hazard Characterization to Risk Communication, with an Emphasis on Contaminated Sites

Cost: \$325

Instructor(s): Michael P. Musso, HDR, Inc.; Lynne Haber, Toxicology Excellence for Risk Assessment (TERA) Center at the University of Cincinnati

Description: This course is aimed at entry to mid-level risk assessors and environmental professionals. Taught by experienced risk assessors in toxicological risk assessment and site

assessment, the course addresses the four elements of the risk assessment paradigm for human health risk assessment (HHRA). The complementary expertise of the teachers provides site assessors with an improved understanding of the key issues underlying risk values, and provides toxicological risk assessors with an improved understanding of the real-world challenges in applying risk values. The exposure assessment portion focuses on issues related to characterizing hazardous waste sites, Brownfields, and other settings. Human health receptors of relevance, along with EPA exposure factors, will be discussed. Examples of conceptual site models (CSMs) will be presented. The hazard characterization and dose-response assessment portions of the course provide a practical understanding of both the fundamental thought processes for developing risk values, and how these methods are evolving with modern biology. We address key concepts for evaluating toxicity data, integrating toxicokinetics data into an understanding of a chemical's toxicity, and for developing an overall weight of evidence evaluation. Dose response assessment and the importance of mode of action will also be addressed. The course will conclude with a discussion of risk characterization and risk communication. Key resources, reference documents and tools will be noted. The course will be interactive and will include in-class exercises.

WK5S: Monte Carlo simulation and probability bounds analysis in R with hardly any data

Cost: \$270

Instructor(s): Scott Ferson, Applied Biomathematics

Description: This revamped full-day workshop features hands-on examples worked in R on your own laptop, from raw data to final decision. The workshop introduces and compares Monte Carlo simulation and probability bounds analysis for developing probabilistic risk analyses when little or no empirical data are available. You can use your laptop to work the examples, or just follow along if you prefer. The examples illustrate the basic problems risk analysts face: not having much data to estimate inputs, not knowing the distribution shapes, not knowing their correlations, and not even being sure about the model form. Monte Carlo models will be parameterized using the method of matching moments and other common strategies. Probability bounds will be developed from both large and small data sets, from data with non-negligible measurement uncertainty, and from published summaries that lack data altogether. The workshop explains how to avoid common pitfalls in risk analyses, including the multiple instantiation problem, unjustified independence assumptions, repeated variable problem, and what to do when there's little or no data. The numerical examples will be developed into fully probabilistic estimates useful for quantitative decisions and other risk-informed planning. Emphasis will be placed on the interpretation of results and on how defensible decisions can be made even when little information is available. The presentation style will be casual and interactive. Participants will receive handouts of the slides and a CD with software and data sets for the examples.

WK6S: Categorical Regression Modeling

Cost: \$300

Instructor(s): J. Allen Davis, U.S. EPA; Jeff Gift, U.S. EPA; Jay Zhao; U.S. EPA

Description: The objective of this full-day course is to provide participants with interactive training on the use of the U.S. Environmental Protection Agency's (EPA) Categorical Regression software (CatReg) and its application to risk assessment. Categorical regression modeling involves fitting mathematical models to toxicity data that has been assigned ordinal severity categories (i.e., minimal, mild, or marked effects) and can be associated with up to two explanatory variables corresponding to exposure conditions, usually concentration and duration. CatReg calculates the probabilities of observing the different severity categories over the continuum of the explanatory variables describing exposure conditions. The categorization of observed responses allows the expression of dichotomous, continuous, and descriptive data in terms of response severity and supports the analysis of data from single studies or multiple studies. CatReg can also estimate the lower confidence limit on the dose (the equivalent of a BMDL) associated with a given severity probability and exposure duration. Additionally, the meta-analytical capability of CatReg allows for the filtering of data in order to determine statistically significant different responses between sexes, strains, and/or species. Recently, EPA has released a new graphic-user interface for CatReg that will greatly increase the efficiency with which users can perform categorical regression analyses; this version of the software will be the focus of this training workshop. Participants need to bring their own laptops, with CatReg installed, to the workshop. The latest version of the software program can be found at: www.epa.gov/ncea/catreg. Disclaimer: The views expressed in this abstract are those of the authors and do not necessarily reflect the views or policies of the U.S. EPA.

WK7S: Integrating Strategic Risk Communication with Risk Management to Enhance Organizational and Behavioral Change

Cost: \$450

Organizers: Steve Ackerlund, Kleinfelder; Daniel Kovacs, Decision Partners

Instructors: Gordon Butte, Decision Partners; Sarah Thorne, Decision Partners

Description: Successful risk management depends on the design, adoption, and implementation of plans and processes that achieve organizational and individual behavioral change. These plans and processes often fall short of achieving optimal outcomes because the technical elements are not aligned with the values, needs, interests and priorities of all of the relevant stakeholders, both within and outside the organization – those who determine project success through their judgments, decision making and behavior. This can result in risk management plans that are not implemented, or are implemented in a non-optimal manner despite their high intrinsic value. This full-day workshop will introduce the state-of-the-science concepts and practices of Strategic Risk Communications and stakeholder engagement to systematically understand and influence judgment, decision making and behavior as an

integrated element of effective risk management. Using lecture, case study review and interactive class exercise formats, facilitators will provide examples from real-world projects that successfully integrated risk communication and risk management. The Mental Modeling Technology™ (MMT) approach will be presented and discussed as a core technique for understanding and communicating about risk, along with other methods to address wide-ranging communication and stakeholder engagement needs. The workshop will feature a dialogue and problem-solving session where participants will be encouraged to share their own risk challenges. Simple tools and templates for integration of risk communication and risk management will be used in the workshop to allow participants to develop solutions to current needs in their organizations.

AM WORKSHOPS - SUNDAY December 6th, 8:00AM-12:00PM

WK8S: Eliciting Judgments from Experts and Non-experts to Inform Decision-making

Cost: \$250

Instructor(s): Aylin Sertkaya, Eastern Research Group, Inc. (ERG); Cristina McLaughlin, FDA; Frank Hearl, NIOSH; Christy Parson, U.S. EPA; Elizabeth L. Durmowicz, U.S. FDA

Description: Decision makers must frequently rely on data or information that is incomplete or inadequate in one way or another. Judgment, often from experts and occasionally from non-experts, then plays a critical role in the interpretation and characterization of those data as well as in the completion of information gaps. But how experts or non-experts are selected and their judgments elicited matters – they can also strongly influence the opinions obtained and the analysis on which they rely. Several approaches to eliciting judgments have evolved. The workshop will cover topics ranging from recruitment, elicitation protocol design, and different elicitation techniques (e.g., individual elicitations, Delphi method, nominal group technique, etc.) to aggregation methods for combining opinions of multiple individuals. The role of judgment elicitation and its limitations, problems, and risks in policy analysis will also be addressed. The workshop will include presentation of two case studies that will include a discussion of the selection process; elicitation protocol development, elicitation technique utilized, and the various issues that arose before, during, and after the elicitation process and the manner in which they were resolved. The class will also include two hands-on exercises where participants will 1) learn about calibration of experts using a mobile application and 2) apply the Delphi and nominal group techniques to examine risk management issues associated with electronic cigarettes.

PM WORKSHOPS - SUNDAY December 6th, 1:00-5:00PM

WS10S: Regional scale ecological risk assessment with Bayesian networks

Cost: \$300

Instructor(s): Wayne G. Landis, Western Washington University; Lara Gaasland-Tatro, Western Washington University

Description: The workshop introduces the students to the estimation of ecological risks at the landscape scale using the relative risk model and its Bayesian network incarnation. The basic methodology has been used in studies across the world excepting Antarctica. Although originally developed for contaminants, the relative risk model is now used for issues ranging from invasive species to climate change. The course covers the derivation of cause-effect models, the application of geographic information systems in the process, risk calculations, describing uncertainty, and risk communication. Now the relative risk model uses Bayesian networks to calculate risk and the conversion from cause-effect conceptual model to function Bayesian network will be described. One of the advantages of the Bayesian network relative risk model is the ease in which it calculates the conditions necessary to reduce risk or modification to include management options. A series of case studies will be presented to demonstrate the utility of the overall approach for estimating risk due to multiple stressors, invasive species, fire and global climate change. Recently methods have been developed to integrate ecological risk assessment with risks to ecosystem services and human health. Summaries of the new methods will be presented as part of the class. Students should bring a laptop and have downloaded the free version of Netica available at <https://www.norsys.com/download.html>. Examples of the models used to teach the course will be available for download.

WK12S: Methods for Quantifying and Valuing Population Health Impacts

Cost: \$275

Instructor(s): Kevin Brand, University of Ottawa; Sandra Hoffman, USDA

Description: The workshop reviews standard practices and emerging issues related to the quantification of a population's health state. Particular attention is paid to the array of metrics available for this purpose, their use in quantifying population health impacts, and how these impact projections can be integrated into economic valuations. Risk assessment typically couples exposure information with an exposure-response relationship to estimate changes in incidence rates (e.g., a mortality rate). Expressed in this fashion (along an incident rate scale) these impact measures fall short. They do not capture the burden of disease, are not readily interpretable, complicate the comparison of disease outcomes, and are not suited to a single number summary. This workshop focuses on the methods required to get readily interpretable, comparable, bottom-line, summaries of health impact. A dizzying array of metrics can be used to quantify health impacts. Consider for example "avoidable deaths," PEYLLs, life-expectancy,

lifetime risk, HALEs, QALYs, DALEs, DALYs and 'attributable-fractions' to name just a few. In this workshop we survey and bring order to these variants, classifying the metrics into a couple of categories. A finer grained classification is provided based on how the metric is calculated; for example does it adjust for the size and age structure of the population under study. The key choices and their influence upon projected outcomes will be outlined. Finally, a survey of the key steps and considerations that are required to map the health impacts, expressed in units such as change in life-expectancy, into health-economic evaluations will be offered.

FULL DAY WORKSHOPS – THURSDAY, December 10th, 8:30AM-5:30PM

WK13T: Monte Carlo simulation and probability bounds analysis in R with hardly any data

Cost: \$270

Instructor(s): Scott Ferson, Applied Biomathematics

Description: This revamped full-day workshop features hands-on examples worked in R on your own laptop, from raw data to final decision. The workshop introduces and compares Monte Carlo simulation and probability bounds analysis for developing probabilistic risk analyses when little or no empirical data are available. You can use your laptop to work the examples, or just follow along if you prefer. The examples illustrate the basic problems risk analysts face: not having much data to estimate inputs, not knowing the distribution shapes, not knowing their correlations, and not even being sure about the model form. Monte Carlo models will be parameterized using the method of matching moments and other common strategies. Probability bounds will be developed from both large and small data sets, from data with non-negligible measurement uncertainty, and from published summaries that lack data altogether. The workshop explains how to avoid common pitfalls in risk analyses, including the multiple instantiation problem, unjustified independence assumptions, repeated variable problem, and what to do when there's little or no data. The numerical examples will be developed into fully probabilistic estimates useful for quantitative decisions and other risk-informed planning. Emphasis will be placed on the interpretation of results and on how defensible decisions can be made even when little information is available. The presentation style will be casual and interactive. Participants will receive handouts of the slides and a CD with software and data sets for the examples.

AM WORKSHOPS - THURSDAY December 10th, 1:00-5:00PM

WK14T: Chemical Mixtures Health Risk Assessment of Environmental Contaminants: Concepts, Methods, Applications

Cost: \$125

Instructor(s): Linda K. Teuschler, LK Teuschler & Associates; Rick Hertzberg, Biomathematics Consulting; Moiz Mumtaz, ATSDR; Glenn E. Rice, USEPA

Description: This problems-based, half-day, introductory workshop focuses on methods to assess health risks posed by exposures to chemical mixtures in the environment. The workshop will present key concepts and terminology used in chemical mixtures risk assessment. This workshop will discuss component methods that utilize assumptions of response addition and dose addition, including the following dose-additive methods: the hazard index, the interaction-based hazard index, relative potency factors, and toxicity equivalence factors. The cumulative relative potency factors method also will be described. The workshop also will address whole mixture methods for assessing risks associated with environmental chemical mixtures; this will include discussion and examples of sufficient similarity. The exercises developed in the workshop will be adapted from mixtures risk assessments conducted for waste sites, pesticide applications, metal exposures, and drinking water disinfection by-product exposures. The “hands-on” exercises demonstrating the methods are an essential part of this workshop. Discussions include real world examples, exercise results, and answers to general questions. (We ask participants to bring a calculator or laptop). *The views expressed in this abstract are those of the authors and do not reflect those of the U.S. Environmental Protection Agency.*

WK15T: Developments in Risk Assessment: State of the Science for Evaluating Toxicity Data for Human Health Risk Assessment

Cost: \$225

Instructor(s): Lynne Haber, Toxicology Excellence for Risk Assessment (TERA) Center at the University of Cincinnati

Description: This workshop will build on the concepts presented in the Sunday workshop (WK4S/11S), presenting advanced methods for human health risk assessment, focusing on the hazard characterization and dose-response portions of the risk assessment paradigm. The workshop will present state of the science information on advanced topics. The first module addresses WHO/IPCS methods for considering weight of evidence for evaluating mode of action, and considering human relevance of the mode of action. The second module addresses the EPA method for data-derived extrapolation factors (DDEFs) and the related IPCS method for chemical specific adjustment factors (CSAFs). These methods use data on a chemical's toxicokinetics or toxicodynamics to refine the extrapolation from animals to humans, or the characterization of human variability. The final module addresses international developments, including predictive tools, combined exposures, and more efficient testing strategies. The course will be interactive and provide opportunities for participants to ask questions.