



Introduction to Modeling Food Safety and Animal Health Risks Using R

ISVEE 16 Pre-Conference Workshop

Objectives and learning outcomes

This 2-day hands-on pre-conference workshop will cover essential risk modeling methods available in food safety and animal health, particularly emphasizing microbial, antimicrobial, and trade risk analysis applications.

The course is taught using the R statistical language and [ModelAssist](#), which are free of cost. While course participants will learn simulation and calculation methods in the R statistical language, the solution to course exercises and models will also be provided in @RISK with Excel for those participants who may want to transition between software platforms.

Participants will also learn how to select appropriate distributions, use data and expert opinion, and avoid common modeling mistakes. Example models from the instructors, including food safety risk assessments, and animal health risk assessments will be used to reinforce the methods and best modeling practices discussed during the class.

EpiX Analytics is one of the leading institutions providing training in quantitative risk analysis in food safety and animal health, and has delivered workshops in five out of the last six ISVEE conferences. This workshop is a recently updated introduction to our Epidemiology and Food Safety Risk Analysis course which we have delivered for over a decade. This 2-day version covers the key elements of risk modeling, and applied case studies are used to guide participants through the main development steps of a risk assessment model. Compared to our 2-3 weeks online introduction class, this in-person course provides the opportunity for more direct personal guidance and feedback, especially during practical exercises.

Who should attend?

This course is well suited to anyone that needs to conduct, present, or critique quantitative risk analyses in food safety, animal health, or One health. This course is also of interest to professionals providing inputs to risk analyses or those who need to use risk analysis results. Also, this workshop is well suited for people who have experience in risk modeling using spreadsheets but want to learn how to use a more flexible modeling environment such as R.

Workshop details

This 2-day course will be delivered in English, but instructors can also answer questions and communicate in Spanish, French, Portuguese, and Italian.

Free registration award!

To encourage participation from students with limited budget, one free class registration award will be offered to a post-graduate (Master or PhD) student currently working on a risk analysis-related project as part of their thesis. Applicants will be asked to send a one-page document explaining how this class would support their project, and their need for the award. The award recipient will be selected by EpiX Analytics based on the relevance of the projects and the applicant's need for economic support. EpiX will coordinate with the ISVEE organization so that the registration can be processed once the recipient is selected. Please note that the successful recipient will be responsible for all travel expenses, lodging, and ISVEE conference registration costs, as this award only covers the course registration costs. For more details, please contact course@epixanalytics.com

Requirements

Participants will be required to bring their own laptops (and a power adapter if needed!) loaded with [R](#), a pdf reader, and a code editor of their choice, such as free [RStudio](#). [ModelAssist](#)[®], EpiX Analytics' reference software in risk analysis will be used to support the lectures. Lecture notes and all model files will be provided in an online repository.

No prior R or simulation modeling knowledge is required for attendance. However, participants will be encouraged to prepare for the class by reviewing [this document](#). Participants with no prior R experience will also be encouraged to learn fundamentals of R programming by reviewing online material such as [Kelly Black's R tutorial](#) (chapters 1-7, 9-10, 13, 15 should be most relevant to this class).

Class Schedule

(This schedule is subject to modifications to best suit the progress and interest of the participants)

Day	Time	Contents	Details
1	Introduction and foundational concepts		
	8:30-8:45	Welcome and introduction to the workshop	Lecture
	8:45-9:15	Brief introduction to food safety and animal health risk modeling <ul style="list-style-type: none"> Codex & OIE frameworks Link between epidemiology and risk assessment 	
	9:15-10:00	Introduction to risk modeling <ul style="list-style-type: none"> Commonly used probability distributions Presenting and interpreting risk analysis in a coherent way 	Lecture (80%) and exercises (20%)
	10:00-10:30	Bio break	
	10:30-12:00	Introduction to risk modeling <ul style="list-style-type: none"> Using the R statistical environment for probability calculations and Monte Carlo simulation 	Lecture (50%), computer lab (50%)
	12:00-13:00	Lunch break	
	13:00-14:30	Basic stochastic processes <ul style="list-style-type: none"> Population and individual state, imperfect diagnostic tests Modeling rates with uncertainty Combining Poisson and Binomial in a risk assessment 	Lecture (30%), computer lab and discussion (70%)
	14:30-15:00	Bio break	
	15:00-16:00	Exercises – stochastic processes	Computer lab
16:00-16:30	Case study: <i>Modeling foodborne illnesses and hospitalizations from raw and pasteurized milk consumption</i>	Lecture and discussion (50%/50%)	
2	Applications and working with data		
	8:30-10:00	Basic stochastic processes <ul style="list-style-type: none"> Further exercises 	Computer lab
	10:00-10:30	Bio break	
	10:30-12:00	Using data and expert opinion for risk analysis <ul style="list-style-type: none"> Fitting distributions to data Incorporating expert opinion 	Lecture (50%), computer lab (50%)
	12:00-13:00	Lunch break	
	13:00-14:00	Data fitting and expert – further opinion exercises	Computer lab
	14:00-14:30	Case study: <i>African Swine Fever testing strategies</i>	Lecture and discussion (50%/50%)
	14:30-15:00	Bio break	
15:00-16:00	Wrap up: <ul style="list-style-type: none"> Risk assessment checklist Modeling epistemic uncertainty – primer and mistakes to avoid 	Lecture (80%) and discussion (20%)	

Workshop Instructors

Francisco Zagmutt

[Dr. Francisco J. Zagmutt](#) is a managing director at EpiX Analytics, where he uses risk modeling and analytics methods to inform key decisions under uncertainty. He is also affiliate faculty at Colorado State University, and a member of the US National Advisory Committee on Microbiological Criteria for Foods (NACMCF). Francisco teaches several public and private courses with EpiX, as well as at the Colorado State University College of Business and formerly at the Royal Veterinary College. He holds a veterinary degree from the University of Chile, a Masters from UC Davis, and a PhD from Colorado State University.

Solenne Costard

[Dr. Solenne Costard](#) is a lead consultant at EpiX Analytics. As part of her consulting and research work, Solenne applies risk analysis modeling and other analytical techniques to a broad range of projects in a variety of industries worldwide, including food safety and animal health. Solenne is one of the instructors of public and private courses given by EpiX in quantitative risk analysis in general, and epidemiology and food safety in particular. Dr. Costard holds a DVM from Toulouse National Veterinary School, a MSc from the Royal Veterinary College and London School of Hygiene and Tropical Medicine, and a PhD from the Royal Veterinary College, London.

Huybert Groenendaal

As managing director at EpiX Analytics, [Dr. Huybert Groenendaal](#) leads and works in consulting projects in a variety of industries, focused on risk analysis and decision modeling. In addition, Huybert teaches a variety of risk analysis training courses, and lectures on the use of risk modeling in business, at the executive MBA program at the Leeds School of Business, University of Colorado at Boulder. He is an affiliate faculty at Colorado State University. He holds a Masters in veterinary epidemiology from Wageningen University (NL), an MBA in Finance from The Wharton School of Business, University of Pennsylvania (USA) and a PhD from Wageningen University (NL).

Testimonials

This class is the best class that I ever took. We learned not only conceptual modeling but also programming in R.

The example problems were challenging/probing and particularly suited to the types of analysis we are expected to conduct in our work. Excellent practical instruction, built on strong statistical theory.

This was the best training class I've ever taken (even better than SAS courses). [The instructor] was an amazing teacher & I would like to take another course again.

Best course I've taken in the past decade at least, a real pleasure! Considering what a broad range of subjects come into play in QRA, it is remarkable how well this course managed to focus in on key concepts and methods - a very worthwhile three days

[EpiX Analytics]' four-day course on Introduction to Animal Health Risk Modeling was extremely worthwhile. [The instructor's] methods of reviewing the vast amount of information on which the field is based, and seamless introduction of brand-new concepts are expert, and it is obvious that he is extremely knowledgeable and genuinely interested in the subject matter. The instructor always had the right anecdote or bit of history to put the issues at hand into context, and in so doing, made for a richer, more memorable experience than just introduction of formulae and application to a specific dataset. He also had an affable and approachable attitude that generated a friendly atmosphere amongst a diverse group of students and promoted a camaraderie that outlasted the few short days of the course. My only regret is that we didn't have longer to soak up more knowledge about this fascinating subject!