



Epidemiology and Food Safety Risk Analysis Course program

ALL PARTICIPANTS ARE ENCOURAGED TO PREPARE FOR THE CLASS BY REVIEWING BASIC KNOWLEDGE, AND COMPUTER COMMANDS IN EXCEL, AND ALSO FOR R FOR THOSE OF YOU WHO WILL BE USING THIS TOOL INSTEAD.

Five-day course:

Day 1	Welcome and General Introduction
<i>Morning</i>	<p>Introduction to risk analysis in epidemiology and food safety</p> <ul style="list-style-type: none"> • Principles and international guidelines • Qualitative, semi-quantitative and quantitative approaches • Risk management and risk communication <p>Statistical foundations and risk modeling</p> <ul style="list-style-type: none"> • Fundamentals of probability distributions and probability theory • Graphical representations of risk events • Monte Carlo simulation, Excel add-ons (@RISK®) and R® <p>Main steps of a risk assessment</p> <ul style="list-style-type: none"> • Designing a model: Conceptual model and model diagrams • Building a model: <ul style="list-style-type: none"> ○ Stochastic processes and data ○ Food-safety specific methods • Modeling parameter and model uncertainty • Communicating results: Typical risk analysis results presentation and interpretation
<i>Afternoon</i>	<p>Stochastic processes and data</p> <p>Binomial and hypergeometric process</p> <ul style="list-style-type: none"> • Binomial, BetaBinomial, negative binomial, geometric, hypergeometric, Inverse Hypergeometric • Practical problems to solve <p><i>Social event</i></p>
Day 2	Stochastic processes and data (cont.)
<i>Morning</i>	<p>Poisson process</p> <ul style="list-style-type: none"> • Poisson, gamma, exponential, Erlang, Polya, and Delaporte • Practical problems to solve <p>Sum of random variables</p>

	<p>Useful identities and approximations</p> <p>Use of disease spread ('epidemic') models in risk assessments</p>
<i>Afternoon</i>	<p>Case studies</p> <ul style="list-style-type: none"> • Conceptual model • Stochastic processes and data
Day 3	Stochastic processes and data (cont.)
<i>Morning</i>	<p>Determining distributions from data / distribution fitting</p> <ul style="list-style-type: none"> • How to use reported data in risk assessment models • Statistical methods to fit distributions to data • Combining data sources and/or expert opinion: mixture distributions and meta-analysis <p>Problems to solve</p>
<i>Afternoon</i>	<p>Food-safety specific methods</p> <p>Principles of food safety modeling</p> <ul style="list-style-type: none"> • Farm to fork vs. empirical and risk attribution models • Exposure assessment – principles in microbial and chemical food safety, food consumptions databases and limitations <p>Dose-response modeling</p> <ul style="list-style-type: none"> • Mechanistic vs. “curve fitting” and empirical models • Chemical vs microbial DR <p>Food safety modeling exercises</p> <p>Social event</p>
Day 4	Modeling parameter and model uncertainty
<i>Morning</i>	<p>Bayesian statistics</p> <ul style="list-style-type: none"> • Theory and derivation, comparison with classical statistical and Bootstrap methods <ul style="list-style-type: none"> ○ Example: modeling p when no events are observed (zero-numerator) • Posterior construction and simulation <ul style="list-style-type: none"> ○ Conjugate priors, discrete approximations, Bayesian Monte Carlo, MCMC, Likelihood-free methods (ABC)
<i>Afternoon</i>	<p>Classical statistics</p> <ul style="list-style-type: none"> • Using classical statistical inference and tests to model uncertainty about population parameters • Mean, SD/SE, prevalence, incidence • Limitations <p>The bootstrap</p> <ul style="list-style-type: none"> • Non-parametric and parametric Bootstrap techniques • Using the bootstrap to model correlations <p>Applications and practical problems to solve</p>
Day 5	Communicating results
<i>Morning</i>	<p>Model design and validation</p> <ul style="list-style-type: none"> • Good practices in risk modeling: how to build and maintain a model (A-Z steps)

	<ul style="list-style-type: none"> • Risk analysis checklist, including common mistakes and their prevention <p>Case studies</p> <ul style="list-style-type: none"> • Stochastic processes and data • Food-safety specific methods • Modeling uncertainty • Communicating results: presentation and interpretation
<i>Afternoon</i>	<p>Case studies (continued)</p> <ul style="list-style-type: none"> • Review of group work • Discussion of participants' modeling problems: link to case studies, relevant methods <p>Delivery of certificates of attendance and adjourn</p>