Short Introductory Course of Risk Assessment
In Animal Health and Food Safety
Date: June 26th – 28th , 2023

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This course will introduce the concepts of probabilistic risk analysis (PRA) using a Monte Carlo and Bayesian frameworks. PRA is an analysis of the frequency and consequences of unwanted events in a system. This type of analysis relies on probabilistic (i.e., predictive) models and associated data. Participants will compare Monte Carlo with Bayesian based methods applied to risk assessment. Bayesian inference techniques are useful in situations where empirical evidence is not available because, unlike frequentist statistical methods, the Bayesian paradigm incorporates this type of information. Furthermore, from a practical perspective, Bayesian techniques, which represent uncertainty with probability distributions, provide a ready framework for the propagation of uncertainties through the risk models.

At the end of this short course, the participants should:

- Be familiar with Monte Carlo and Bayesian risk assessment frameworks
- Conduct basic Monte Carlo simulations
- Understand the components of a Bayesian risk assessment model
- Develop posterior distributions from common Bayesian models in Excel and OpenBUGS

Main course text:

1. Bayesian Inference for Probabilistic Risk Assessment. 2011. A practitioner's guidebook. D. Kelly and C. Smith. Springer

Supplementary reference reading material:

Risk Assessment

2. Quantitative Microbial Risk Assessment. 2014. Second Edition. Haas CN et al. Wiley
3. Risk Analysis: A quantitative guide. 2008. Third Edition. Vose D. Wiley.

Bayesian

4. Applied Bayesian Statistics with R and OpenBUGS examples. 2013. MK Cowles. Springer.
5. The BUGS book. A practical introduction to Bayesian Analysis. 2013. D. Lunn et al. CRC Press.
6. Veterinary Epidemiological Research. 2009. Chapter 24. Dohoo et al. VER Inc.

Previous knowledge:

- Participants should be familiar with the concepts of risk, probability, and probability distributions, and they should have a basic knowledge of R.

Software required:

- Participants should have R and OpenBUGS (http://www.openbugs.net/) installed in their laptops.

This course will be offered on-line (pre-recorded sessions and live) and if sufficient interest exists for an in-person component of the course at UPEI, it will be arranged before the course starts. The course will include 5 sessions of approximately 3 hrs each. A preliminary program is presented below. Final details will be posted before the course.

Tentative Program - Time for live sessions will start at 9am ADT (final time will be provided once the participant list is finalized) (live sessions will be recorded and uploaded into Moodle)

June 26th		
Session 1	Lecture	Lab
	L1-Introduction to Risk Analysis. OIE and FAO frameworks. L2-Monte Carlo (MC) and Bayesian approaches for risk assessment. L3-Developing a model and risk pathways	Development a conceptual model
Session 2	Lecture	Lab
	L4-Common Probabilistic Models in Risk Assessment	
		Introduction to R – mc2d Monte Carlo Exercises (R)
June 27th		
Session 3	Lecture	Lab
	L6- Introduction to Bayesian analysis and MCMC	Introduction to OB Case Study 1A – Ecoli MC Case Study 2A – Rabies Bayesian (R)
Session 4	Lecture	Lab
	L7- Priors 1 L8- Priors 2 L9- Propagating uncertainty	Ex Conjugate calculation (OB) Ex Uncertainty propagation (OB) Regression ex- E. coli (OB)
June 28th		
Session 5	Lecture	Lab
		Case Study 1B: E. coli OB
		Case Study 2B: Rabies OB
		Case Study 1 and 2: Discussion
	Final discussion and Course Wrap-up	

OB=OpenBUGS