Quantitative Ecotoxicology Short Course

College of William & Mary's
Virginia Institute of Marine Science
Gloucester Point, VA 23696
June 17-21, 2013

Course Objective & Structure

To present quantitative methods for the analysis of ecotoxicological data and to apply them with laptop software. Emphasis is placed on the scientific and statistical soundness of techniques. Morning presentations by M. Newman will outline quantitative methods and statistical aspects of their implementation. Example data sets will be analyzed using PC-based software during the afternoon sessions.

Since 1995, Quantitative Ecotoxicology has been taught at various locations including the University of Georgia (Athens, GA), Savannah River Ecology Laboratory (Aiken, SC), the College of William & Mary's Virginia Institute of Marine Science (Gloucester Point, VA), Royal Holloway University of London (Egham, UK), University of Koblenz-Landau (Germany), University of Antewerp (Belgium), Technical University-Sydney (Australia), University of Hong Kong (Kowloon, Hong Kong), Huazhong Normal University (Wuhan, China), the University of Joensuu (Joensuu, Finland), Jagiellonian University (Krakow, Poland), and Bayer Agrochemicals (Stillwell, Kansas). Student evaluations rated the course of 8.9 to 9.5 based on a scale from 0 (not useful/effective at all) to 10 (extremely useful/effective).

Textbook

Most descriptions of techniques and examples are drawn from the book, *Quantitative Ecotoxicology* by M.C. Newman. 2013. Taylor & Francis/CRC Press, Boca Raton, FL, pp. 570. Purchase of the textbook is highly recommended to get the most from the short course. More details about the book can be found at http://www.crcpress.com/product/isbn/9781439835647.

Further Information:

Prof. Michael C. Newman, College of William & Mary's Virginia Institute of Marine Science, Gloucester Point, VA 23062-1346, Telephone: (804) 684-7725, Fax: (804) 684-7186, E-mail: newman@vims.edu. Information about the instructor can be found on his webpage, http://www.vims.edu/research/departments/eaah/people/faculty/newman_borrowed.php.

Course Outline

Day 1 Bioaccumulation

- Elimination: Simple Models, Reaction Order, Michaelis-Menten Kinetics, Curve Fitting
- Elimination: Interpreting Two Compartment Models
- Elimination: Multiple Compartment Models
- Elimination: Backstripping, Akaike's Information Criterion, Model Selection Criterion
- Bioaccumulation: Rate Constant-based Models
- Bioaccumulation: Clearance Volume-based Models
- Bioaccumulation: Physiologically-based Pharmacokinetics Models
- Bioaccumulation: Fugacity-based Models
- Statistical Moments Approach
- Effects of Selected Factors on Bioaccumulation
- Bioavailability

Day 2 Lethal Effects

- Dose-Response: Metameters
- Dose-response: LC50 and Related Nonparametric, Semiparametric and Parametric Methods
- Dose-Response: Up-and-Down (Sensitivity) Technique
- Dose-Response: Threshold Models
- Dose-Response: Coping with Control Mortality and Assessing Duplicate Treatments
- Time-Response: LT50 Methods
- Time-Response: Time-to-death and Related Nonparametric, Semiparametric, and Parametric Methods
- Time-Response-Concentration Models: Incorporation of Covariates

- Mixture Effects

Day 3 Chronic Lethal & Sublethal Effects

- One-way Analysis of Variance: General, Tests of Normality, Tests of Homogeneity of Variance
- Treatment Means Comparison to Control Mean: Equal and Unequal Number of Observations
- Monotonic Trend: Williams's Test
- Nonparametric Methods
- The Importance of Power Analysis
- Alternative Methods: Simultaneous Confidence Intervals, Predictive Values, Bayesian Methods
- Relating Biological Significance and Statistical Significance

Day 4 - Effects on Populations and Metapopulations

- Basic Epidemiology Metrics: Causation, Prevalence/Incidence, Logistic Regression
- Population Size and Density Estimation Methods: Quadrat, Mark-Recapture, and Removal-Based Approaches
- Population Growth: Basic Growth Models and Stability Criteria, Pollutant Take and Sustainable Yield
- Demography: Simple Life Tables, Matrix-Based Techniques
- Spatial Distribution of Individuals: Discrete and Arbitrary Sampling Units Methods
- Metapopulation Models and Dynamics
- Population Genetics: Hardy-Weinberg Equilibrium, Measuring Natural Selection, Genetic Drift and Effective Population Size, Wahlund Effect, Quantitative Genetics, Selection Components, Tolerance

Day 5 - Community Effects

- Simple Species Interactions: Predator-prey, Two Species Competition, Several Species Competition
- Community Structure: Species Abundance Models - Geometric Series, Log Normal, Log Series and Broken Stick Models.
- Pollution and Species Abundance
- Community Structure: Species Richness, Diversity, and Evenness.
- Community Similarity
- The Importance of Spatial Scale
- Community Function: Productivity and Respiration, Detritus Processing, Nutrient Spiraling, and Colonization and Succession
- Metacommunities
- Trophic Transfer

COST

Cost covers lectures, class handouts, use of software programs, and refreshments. Transportation can be provided between the Duke of York Hotel and the classroom if requested. Attendees can purchase the textbook themselves before the course begins or receive it as part of the short course.

Course $525
Course plus Textbook $660

Register by May 21, 2013 at https://forms.wm.edu/8648.
Please note that the course is open to the first 20 individuals applying.

Do not send any payment at this time.