Syllabus Module 230 Major B ISB: "Multi Level Analysis"

Module : 230	**Multi-Level Analysis**
UE coordinator	Jay S KAUFMAN, PhD McGill University, Montreal
Dates	December 12th to 16th 2016
Credits/ECTS	3 ECTS
Duration	5 days of 6 hours = 30 hours
UE description	Multilevel analysis has emerged as a useful analytical technique in several fields, including public health and epidemiology. Multilevel analysis allows for clustered data that represents a hierarchical structure, and allows for measurements at each level and effect estimate or predicted values at each level. The techniques also apply equally to data nested within individuals, as in a longitudinal setting.
Prerequisit	Advanced core in Biostatistics
Course learning objectives	At the end of the module, the students should be able: - Apply and fit multilevel and clustered data regression models using the STATA software package - Develop methods for hierarchical data analysis - Obtain predicted values and interpret estimated coefficients as epidemiologic parameters - Specify marginal models or cluster-specific models as appropriate - Test different models with random effects, especially linear and logistic models for additive and multiplicative effect parameters - Discuss multilevel analysis applications for public health policies and programs
UE Structure (details of sessions title/speaker/date/duration)	As described, below, all morning four hour sessions consist of lectures provided by Dr Jay Kaufman, and the 3.5 Hour afternoon sessions are for lab exercises, with Dr Kaufman and Dr. Tarik Benmarhnia (teaching assistant). Outlines per lecture are given below Session 1. J Kaufman's Lecture includes what follows: - Review of Regression Modeling in Epidemiology - Mean Square Error and Bias/Variance Trade-Off - James-Stein and Empirical Bayes Shrinkage - Non-Collapsibility of the Odds Ratio - Marginal versus Conditional Estimators - Simpson's Paradox and Selection Bias Session 2. Practice 3H30, Drs Kaufman & Benmarhnia. Session 3. J Kaufman's Lecture includes what follows - Hierarchical Data Models - Random Effects ANOVA - Fixed Versus Random Effects - Empirical Bayes Prediction - Parameter Estimation and Model Fitting - Intraclass Correlation Coefficient - Discussion of Merlo et al 2006 Session 4. Practice 3H30, Drs Kaufman & Benmarhnia Session 5. J Kaufman's Lecture, includes what follows - Random Intercept Models with Covariates - Between and within effects of Level-1 covariates

	- Cluster-level confounding - Hausman Test for Endogeneity - Random Coefficient Models - Review of Effect Heterogeneity - Discussion of Merlo et al 2006 Session 6. Practice 3h30, Drs Kaufman & Benmarhnia Session 7 J Kaufman's Lecture includes what follows: - Marginal Models - Models for Categorical Responses - Random Intercept Logistic Regression - Median Odds Ratio - Predicted Probabilities from Categorical Models - Multilevel Fixed Effects - Discussion of Schempf & Kaufman 2012 Session 8. Practice 3h30, Drs Kaufman & Benmarhnia Session 9 J Kaufman's Lecture, includes what follows: - Differences in Differences Models - Contextual, Ecologic and Within Effects in Neighborhood Studies - Random Effects Poisson Regression and Negative Binomial Models - Random Effects Random Effects Cox Proportional Hazards Model - Discussion of Hubbard et al 2011 - Questions/Answers/Summary Session 10. Practice and Final Exam 3h30, Drs. Kaufman & Benmarhnia
Course requirement	Students will practice exercises in Stata software during each afternoon lab session and will do additional homework practice.
Grading and assessment	Written in class exam is scheduled on Dec 18, 2:00 -4:00 pm
Location	George Sand EHESP Campus in Paris
Readings	Greenland S. Principles of multilevel modelling. Int J Epid 2000: 29(1):158-67. Efron & Morris. Stein's Paradox in Statistics. Scientific American 1977; 236: 119-127. Kaufman et al Modeling Community-level Effects on Preterm Birth (2003) AEP Vol. 13 (5). 5377–384 doi:10.1016/S1047-2797(02)00480-5 Merlo J, Chaix B, et al (2005a) A brief conceptual tutorial of multilevel analysis in socialepidemiology: linking the statistical concept of clustering to the idea of contextual phenomenon J Epidemiol Community Health, 59:443–449. doi: 10.1136/jech.2004.023473 Merlo J, Chaix, B et al THEORY AND METHODS (2005b) A brief conceptual tutorial on multilevel analysis in social epidemiology: investigating contextual phenomena in different groups of people, J Epidemiol Community Health 59:729–736. doi: 10.1136/jech.2004.023929 Schempf AH, Kaufman JS et al (2011) The Neighborhood Contribution to Black-White Perinatal Disparities: An Example From Two North Carolina Counties, 1999–2001American Journal of Epidemiology Vol. 174, No. 6 DOI: 10.1093/aje/kwr128 Schempf AH, Kaufman JS (2012) Accounting for context in studies of health inequalities: a review and comparison of analytic approaches, Annals of Epidemiology, Volume 22, Issue 10: 683–690 Rabe Hesketh & Skrondal "Multilevel and Longitudinal Modeling Using Stata" (2012), 3rd Edition, chapter 2. Hawkins SS, Chandra A, Berkma L (2012) The Impact of Tobacco Control Policies on Disparities in Children's Secondhand Smoke Exposure: A Comparison of Methods, Mater Child Health 16: S70-S77 Harper S, Strumff EC, Kaufman JS (2012) Do Medical Marijuana Laws Increase Marijuana Use? Replication Study and Extension, AEP 22(3) 207-212