



LUNDS UNIVERSITET
Naturvetenskapliga fakulteten



An introduction Structural Equation Modeling for Ecology & Evolutionary Biology

11–15 of February 2019, Lund University

With given support from the Graduate research school ClimBEco *Dr. Jarrett Byrnes* from UMASS Boston, one of the developer of the ‘lavaan’ package in R, are visiting Lund University one week in February 2019 to introduce structural equation modeling for ecology and evolutionary biology students and researchers.

Structural Equation Modeling (SEM) or path analysis is a multivariate technique that can test for the nature and magnitude of direct and indirect effects of multiple interacting factors. SEM is an approach that interprets information about the observed correlations among the traits of organisms or groups of organisms in order to evaluate complex causal relationships. It is a rich technique that is particularly well suited for large-scale observational community or population data sets. Its intuitive connection to how we conceive of our study systems makes it a powerful and useful technique for ecologists and evolutionary biologists. The aim of this course is to familiarize with the basic techniques of SEM using the ‘lavaan’ package in R.

Schedule

Before the course starts students are required to work through a preclass-exercise and tutorial.

Day 1.

Lectures: What is SEM? How can it be part of your research program, SEM as a process: Creating multivariate causal models, Fitting piecewise models
Exercises: Creating causal conceptual models, Piecewise model creation

Day 2.

Lectures: Fitting observed variable models with covariance structures, What does it mean to evaluate a multivariate hypothesis? ANCOVA revisited & nonlinearities.
Exercises: Fitting observed variable structural equation models in R

Day 3.

Lectures: Multigroup models, Latent variable models
Exercises: Multigroup analysis and the introduction of the latent variable

Day 4.

Lectures: Composite variables, Prediction using SEMs, Dealing with clustered data, space and time, How to fool yourself with SEM (sensu Kline)
Exercises: Composites & other advanced techniques

Day 5.

Open lab and student presentations

Language

English

Literature

Will be announced at the beginning of the course

Examination

To pass this course PhD-students must perform an oral presentation of their individual SEM projects as well as provide a written report including a motivation of why structural equation modeling was used for the data set, a visual illustration of the SEM model, R code and statistical evaluation of the SEM model.

Additional information

Basic proficiency in R is needed in order to work through the course. This means that before attending the course students are expected to:

1. Have R installed on the computer and be able to access help files
2. Install and load new libraries
3. Load data files
4. Plot relationships between two variables from a data set
5. Perform basic linear regression and get summary statistics for parameter fits and F-tests

Course points

3 ECT

Application and course cost

There are no costs for attending the course. To be eligible for the course the participants must be enrolled as a PhD-student. Researchers within all other academic levels are also welcome to apply, but priority will be for PhD-students in the occurrence of too many applicants. Applications from PhD-students and researchers from outside of Lund University will also be accepted. ClimBEco participants have acceptance priority as well as a number of reserved seats for this course. Please send in a letter of motivation and your CV by 31th of January 2018 to christian.alsterberg@biol.lu.se

Course organizer

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Course location

Department of Biology, Lund University. Lecture room will be announced later.