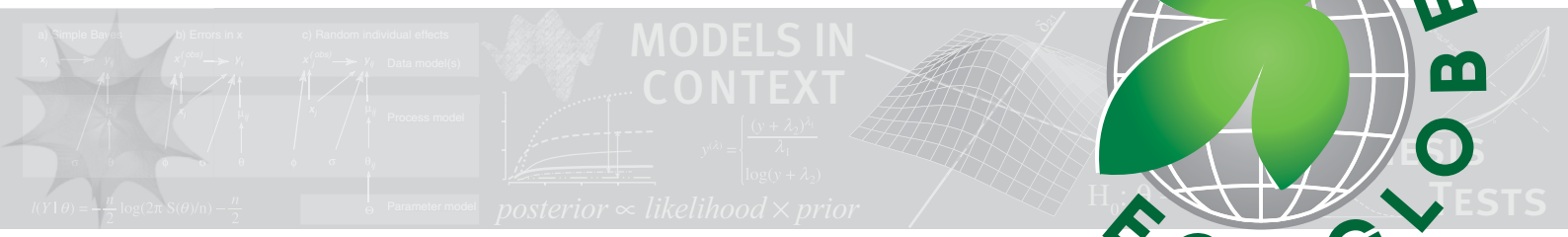
ECOGLOBE PhD course – October 2011



Fitting empirical data to ecological models

5 ECTS

Place:

Department of Terrestrial Ecology, National Environmental Research Institute, Aarhus University, Vejlsøvej 25, DK-8600 Silkeborg, Denmark.

Time:

October 24, 08:30 to October 28, 18:00.

Participants:

The course is open to Danish (including ECOGLOBE) as well as international PhD students. Maximum of 20 participants.

Objectives:

The PhD students will be introduced to using advanced statistical methods, such as state-space models, structural equation models, and Bayesian networks, which are becoming increasingly popular for fitting empirical data to ecological models. The aim of the course is to introduce the students to the applied use of likelihood functions and Bayesian statistics, setting up advanced statistical models with latent parameters, and making quantitative predictions with a known degree of uncertainty. The students will learn to i) assess the possible value of using advanced Bayesian methods in the students own scientific work; ii) critically evaluate scientific literature using advanced statistical models. After the course the student is expected to have sufficient background knowledge to model his or her own data.

Contents:

- Introduction to simple computer programming
- Introduction to simple ecological modeling
- Likelihood functions and Bayesian statistics
- Fitting advanced models to ecological data using MCMC methods
- Ecological predictions.

Preparation for course:

Before the start of the course, participating PhD students have to read 150 pages in the course textbook (Clark, 2007), installed the required software and followed some software tutorials corresponding to a work load of 50 hours.

Course structure:

TheThe topics of the 5 days are as detailed below, and each topic starts with a lecture followed by computer exercises which are carried out in teams of two-three participants. Each participant has to produce a personalized report of the exercises. During the course, the participants should be prepared to work outside the scheduled classes in order to complete the computer exercises.

Evaluation:

The personalized reports (approximately 20-40 pages, corresponding to a work load of 20 hours outside, and in the week after the end of the scheduled classes) has to be completed and submitted no later than November 9, for approval (pass/fail) by the organizer.

Literature:

Clark, J.S. (2007) Models for ecological data. Princeton University Press, Princeton. Further material including research papers will be available through the course homepage.

Software:

In the course the software *Mathematica* will be used. Before the course the student should have installed Mathematica on his or her portable computer and have followed some of the tutorials at "http://www.wolfram.com/broadcast/#Tutorials". The software can be bought from "www.wolfram.com" (student prize ca. 800 DKK), but it can also be downloaded as a free 15-day trial version, which will be sufficient to follow the course – **do not download the free trial-version before two days prior to the start of the course.**

Course Programme

Sunday, October 23

18:00	Arrival (if needed)

Monday, October 24

08:30 – 10:00	Lecture 1: Welcome, Introduction to Course and Mathematica
10:00 – 10:15	Coffee
10:15 – 12:00	Computer Exercises
12:00 – 13:00	Lunch
13:00 – 15:00	Lecture 2: Population growth and competion models
15:00 – 15:15	Coffee
15:15 – 17:00	Computer Exercises
19:00	Course Dinner

Tuesday, October 25

08:30 – 10:00	Lecture 3: Likelihood functions
10:00 – 10:15	Coffee
10:15 – 12:00	Computer Exercises
12:00 – 13:00	Lunch
13:00 – 15:00	Lecture 4: Bayesian methods
15:00 – 15:15	Coffee
15:15 – 17:00	Computer Exercises

Wednesday, October 26

08:30 – 10:00	Lecture 5: Fitting models to ecological data
10:00 – 10:15	Coffee
10:15 – 12:00	Computer Exercises
12:00 – 13:00	Lunch
13:00 – 15:00	Computer Exercises
15:00 – 15:15	Coffee
15:15 – 17:00	Computer Exercises

Thursday, October 27

08:30 – 10:00	Lecture 6: Ecological predictions
10:00 – 10:15	Coffee
10:15 – 12:00	Computer Exercises
12:00 – 13:00	Lunch
13:00 – 15:00	Computer Exercises
15:00 – 15:15	Coffee
15:15 – 17:00	Lecture 7: Presenting other work

Friday, October 28

08:30 – 10:00	Computer Exercises
10:00 – 10:15	Coffee
10:15 – 12:00	Student Discussion of Papers
12:00 – 13:00	Lunch
13:00 – 15:00	Computer Exercises
15:00 – 15:15	Coffee
15:15 – 17:00	Computer Exercises
17:00 – 18:00	Pizza & Evaluation
18:00	Departure

Monday, November 7

Submission of final report by e-mail to Christian Damgaard (cfd@dmu.dk).

Monday, November 21

Report graded passed/failed by the organizer.

Fee:

There is no fee for ECOGLOBE PhD students. For other PhD students the fee is 4 000 DKK.

Travel and accommodation:

All other expenses for accommodation and travel are paid by the individual PhD students, except for lunches, the course dinner Monday, October 24, and pizzas Friday, October 28, which are included in the fee.

Registration:

To Christian Damgaard (cfd@dmu.dk) no later than September 23. Payment of fee should be made no later than October 14. Details on method of payment are given on the course homepage.

Teacher: Christian Damgaard (cfd@dmu.dk), Professor, Dr. Scient.