



PhD e-course in

Ecological Modelling

Aarhus University

September to December 2012 (10 ECTS)

Course contents

Ecological models are developed as tools to tame the complexity of nature. However, students and scientists alike often become overwhelmed by the unintended complexity of their own creation, the model itself. During this course you will learn how to use the open-source modelling tool *Universal Simulator* (www.ecolmod.org) to get a handle on complexity.

You will learn the basic skills needed to write open-source software in the C++ programming language. Emphasis will be given to learn the techniques used to construct plug-in models for the Universal Simulator. The method will be learning-by-doing through practical exercises and experiments on the computer.

Halfways through the course each student must choose an ecological system to model. The remainder of the course focuses on constructing this model as a plug-in that will be published on Internet. The student is helped through the difficulties of model construction through frequent online meetings with the teacher.

If the student has previous knowledge with C++ or other programming languages, the learning curve will be less steep. However, previous knowledge on programming is not a necessity to follow the course.

Earlier students developed models of microbial dynamics in pig slurry, lake oxygen dynamics, photosynthesis induction, farmer management behaviour, weed growth and grassland cattle production. The systems were located in Denmark, Norway and Uruguay.

Course format

The course was designed to be flexible, so that it can be adjusted to the skills and needs of the students:

- The duration is one semester, the backbone formed by a row of 14 lectures. Teaching will take place on Internet during normal working hours at GMT+1.
- The first 7 lectures are followed by short practical programming exercises.
- The topics of the remaining 7 lectures will be extracted from the modelling problems that the students run into during their modelling projects.
- The main effort of the students will be to complete their own modelling project, defined by themselves.

Learning outcomes

After the course the student will be able to

- write simple open-source programs in the C++ language
- construct own models as plug-ins for Universal Simulator software

Evaluation

The student must, by the end of the course, deliver a working model programmed as a plug-in for Universal Simulator software.

Teacher

Senior Scientist Niels Holst, Department of Integrated Pest Management, Flakkebjerg Campus, Aarhus University. E-mail: niels.holst@agrsci.dk.

Contact

The course is arranged by Graduate School of Science and Technology, Aarhus University, Denmark.

Interested students are invited to contact the teacher to register or ask for further information.