Elective 4:
Ecological Modelling
Selected Topic: New Diagnostics for Environmental Management

Module No.	**Module name** Ecological Modelling
Module coordinator Dr. Helmer Schack-Kirchner Email: Helmer.Schack-Kirchner@bodenkunde.uni-freiburg.de	
Additional teaching staff **Prof. Dr. Hildebrand, Dr. Gerald Kändler (FVA), Dr. Felix Knauer**	
Syllabus What is modelling? Introduction to theoretical ecology Modelling Tools System Analysis and algorithmic thinking, basics principles of cybernetics Differential equations Introduction to computer programming with modelling examples Implementation of simple ecological models - humus dynamics ,- carbonate weathering - temperature regime in soils, transport of water and matter in soils - population models - cellular automats - point processes - Markov processes - brief introduction to related topics: fuzzy logic, fractal geometry, deterministic chaos Model evaluation	
Learning goals and qualifications Ability to assess and critically evaluate existing models Understanding systems and their components Ability to translate rules and statistical relationships into algorithms Ability to analyse (dynamic) processes and recognize essential functional and structural relationships and interdependencies as well as dynamics Ability to implement and use simple models to test hypothesis	

Teaching and learning methods

Lecture (10%), CBT + Lecture (40%), CBT Exercises 40%

Prerequisites

Requirements for registration

Distribution of work load

Contact hours 80 h (Lectures, pracs, excursion, exam)

Student learning 45 h (Preparation, reading etc.)

Proposed assessment

Link to learning resources

Preliminary Reading

Comments

EMERY ROE **DRAFT** 10/16/2008

Proposed Three-Week Module for November 2008

in the M.Sc. Forest Ecology and Management, University of Freiburg

Title: New Diagnostics for Environmental Management.

Consistent with the focus of the MSc course, "Forest Ecology and Management," on the sustainable management of natural resources, the proposed 3-week module centers on new diagnostics for environmental management, including new frameworks for the management of ecosystems and forests. The aim of the module is to give students new ways of thinking about how to better analyze environmental issues and effectively manage environmental resources in light of these analyses—both for now and in the future, both locally and globally.

Here is the outline and timeline for **New Diagnostics for Environmental Manageme** nt:

Week 1 (5 week days, four hours a day, 9.00 -13.00 hrs)

1. Presentation, discussion and exercises for a consolidated framework for environmental management based on typologies for: management regimes (including those for sustainable and adaptive management regimes); cultures, organizations and management performance modes; and the reliability space for environmental managers.

2. Case studies from California and The Netherlands using the consolidated framework.

Week 2 (5 week days, four hours a day, 9.00 – 13.00 hrs)

1. Special Topics (including exercises)

- The Challenge of Overpopulation and Globalization
- The Challenge of Better Environmental Integration
- The Challenge of Better Anticipation and Resilience
- The Challenge of Setbacks and Errors in Management
- The Challenge of Better Bandwidth Management

2. Lessons for Environmental Managers from Theory and Practice:

- The case of Theory Triangulation on What Makes for Sustainability

Week 3 (5 week days)

1. Lessons for Environmental Managers from Theory and Practice (continued):

- What Makes for Good Enough Reliability, with Course Wrap-Up (Monday, 9.00 – 13.00 hrs)

2. Preparation of Student Memos and PowerPoint Presentations (students working on their own time, including 1 hr tutorial with instructor for each student): Tuesday and Wednesday.

3. Presentations and Discussion of Memos: Thursday and Friday (9.00 – 13.00 hrs)