FMJ3749 Environmental modeling: Dynamic Processes in Natural Systems 7.5 credits

Miljömodellering: Dynamiska processer i naturliga system

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FMJ3749 valid from Spring 2018

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Eligible for the third-cycle education.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The purpose of this course is to provide knowledge and overview of methods for environmental modelling and its goals. The course will also provide knowledge and practice of model building and evaluation. You will also train your ability to communicate environmental modelling. Application examples illustrate particularly water quality issues, but also touch upon global element cycles and ecological modelling. You will use numerical modelling tools for reactive transport of contaminants in soil and the cycling of substances in natural systems. You will deepen your knowledge in a project work, preferably related to your research.

After finishing the course, you should be able to

- Describe the main aims and parts of environmental modelling as well as key concepts of environmental modelling;
- Describe and distinguish between deterministic and stochastic models, static and dynamic models, forward and backward modelling, empirical and mechanistic models, in terms of concepts and uses;
- Formulate, implement, test and analyse conceptual and quantitative dynamic models of systems of relevance to the environment or within Industrial Ecology / Environmental management
- Use one or more numerical modelling tools for application in environmentatl modelling;
- Understand written descriptions of environmental modelling and apply environmental modelling to (help) solving a selected contemporary sustainability/environmental challenge and communicate the results
- Use environmental modelling within your own research area (provided that it is well-connected to the course focus)
- In a fundamental way communicate environmental modelling to different users/stakeholders, and describe the role of environmental modelling in research and development, environmental issues (including risk) and policy issues.

Course contents

- Basic principles of environmental modelling and mathematical quantification
- Basic definitions and principles for model development, evaluation and application (good practice)
- Quantification of chemical processes and transport (basic level)
- General formulation of mass balances and its applications in environmental modelling
- Own work with numerical modelling tools
- Training in the reading of environmental modelling texts and manuals and in evaluation of modelling work
- Examples of modelling of water quality changes, global and local elements, cycles and ecosystem dynamics
- Own project in environmental modelling

Course literature

To be announced at the course start.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.