



## Syllabus

### **TN0105.1 System, Model and Simulation, 6.0 credits**

#### **System, modell och simulering**

The course is given as course independent of study programme

Syllabus discontinued 11 October 2007

Version 1 in Slukurs. Corresponds to version 1 in Ladok

#### **Syllabus approved**

22 May 2002

The version applies to students admitted from spring 2002 to autumn 2008

The version is not a module version

#### **Subjects**

Technology/Technique

#### **Education cycle**

First cycle

#### **Modules**

<b>Title</b>	<b>Code</b>	<b>Credits</b>
Single module	0101	6.0

#### **Advanced study in the main field**

#### **Grading scale**

Pass / Failed

The requirements for attaining different grades are described in the course assessment criteria which are contained in a supplement to the course syllabus. Current information on assessment criteria shall be made available at the start of the course.

## Language

Swedish

## Prior knowledge

Mathematics (D), physics (A) and English (A) from Upper Secondary School

## Objectives

The objectives of this course are to provide insight and basic theoretical knowledge in systems analysis sciences. The student will after the course:

- Understand basic ideas, concepts and methods in systems analysis.
- Understand how a system analytical project is performed.
- Understand which models can be handled with analytical methods and which require numerical methods like simulation.
- Understand which aspects can be described and analysed by different types of models, techniques and tools given the objective and the system definition.
- Have basic insight and skill in the most usual types of modelling and simulation of complex systems.
- Understand and be able to handle techniques like model fitting, sensitivity analysis, optimisation and prediction.

## Content

A study originates from a purpose. Based on this purpose, a system is defined as a part of the real world. The system is then described in form of a model. Models can be of many different kinds like static or dynamic, deterministic or stochastic etc.

A central part of the course consists of laboratory exercises where the student builds, simulates and analyses some 25 models of different kinds (static/dynamic and deterministic/stochastic). A large effort is also devoted to bringing the student to understand the relation between the structure of a system or model and the resulting behaviour. General techniques like model fitting, sensitivity analysis and optimisation are treated and practiced in these laboratory exercises. An important part of the course treats how a project is organised and accomplished.

The course has the following main components:

- The Systems Analysis view, concepts and theory
- Systems analysis approach to run a project
- Different ways of studying a real system and the general ideas and methods

behind model building and simulation

- Model building and simulation with static models
- Continuous System Simulation
- Discrete Event Simulation
- Optimisation methods, model fitting and sensitivity analysis
- Laboratory exercises: Use of computer simulation for description, analysis and understanding of complex systems and practise of different general techniques especially with applications on energy systems.

## **Implementation**

Lectures 28 hours

Laboratory exercises 32 hours (compulsory)

## **Examination**

### **Requirements for examination**

Examination, written or verbal. Passed laboratory exercises.

Passed laboratory exercises and passed examination.

- If the student fails a test, the examiner may give the student a supplementary assignment, provided this is possible and there is reason to do so.
- If the student has been granted special educational support because of a disability, the examiner has the right to offer the student an adapted test, or provide an alternative assessment.
- If changes are made to this course syllabus, or if the course is closed, SLU shall decide on transitional rules for examination of students admitted under this syllabus but who have not yet passed the course.
- For the examination of a degree project (independent project), the examiner may also allow the student to add supplemental information after the deadline. For more information on this, please refer to the regulations for education at Bachelor's and Master's level.

## **Additional information**

- The right to take part in teaching and/or supervision only applies to the course date to which the student has been admitted and registered on.
- If there are special reasons, the student may take part in course components that require compulsory attendance at a later date. For more information on

this, please refer to the regulations for education at Bachelor's and Master's level.

**Responsible department**

Department of Energy and Technology

**Supplementary Information**

*Finalized by:* Programnämnden för naturresursprogrammet

*Replacement course:* TN0137