

SYLLABUS

Objectoriented modeling and simulation 7.5 credits R0003E

Objektorienterad modellering och simulering

Course syllabus admitted: Spring 2017 Sp 4 - Autumn 2017 Sp 2

**DECISION DATE
2017-01-13**

Objectoriented modeling and simulation 7.5 credits R0003E

Objektorienterad modellering och simulering

First cycle, R0003E

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Reglerteknik	Automation Technology

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and Ordinary differential equations, linear algebra, laplace transforms, frequency functions, basic knowledge in physics (M0018E or E0003E).

Alternative:

Alternative to completed courses can be corresponding knowledge acquired through work within the processindustry or electronics sector.

Selection

The selection is based on 1-165 credits.

Examiner

Thomas Gustafsson

Course Aim

The course aim is for students to acquire basic knowledge of feedback systems, their design and their use in control engineering applications.

The students should have the skills and knowledge to:

- demonstrate knowledge of basic methods and terminology of automatic control..
- demonstrate a basic knowledge of proven methods for designing controllers.
- demonstrate the ability to model and simulate dynamic systems based on balance equations and constitutive relationships.
- use an object oriented modelling language to build hierarchical models.
- using mathematical methods to analyze the static, dynamic and frequency characteristics of dynamic systems.
- use standard methods for designing and analyzing controllers.
- demonstrate an ability to, in a team, design and implement controllers, as well as evaluate their performance for a real process.
- demonstrate good ability to, both orally and in writing, report on the practical work of modeling, design and implementation of closed loop control for a real process.
- identify the usefulness of models and their limitations, and identify the need for more advanced methods.

Contents

Introduction to mathematical modeling of physical and other types of systems. Modeling and analysis of interconnected systems. Time and frequency properties of dynamical systems. Bond graphs. Object oriented modeling with Modelica. Scaling and model reduction. Simulation of dynamical systems. Laplace transforms and transfer functions. Properties for feedback systems. PID-control

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The teaching consists of lectures, problem seminars, mandatory assignments and laboratory work.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Written exam with differentiated grades and approved lab work

Overlap

The course R0003E is equal to R0004E, R0001E, SMR058

Literature. Valid from Spring 2017 Sp 4

Gene F. Franklin, Feedback Control of Dynamic Systems, Global Edition, Upplaga 7, Pearson Education Limited, ISBN 9781292068909.

Course offered by

Department of Computer Science, Electrical and Space Engineering

Items/credits

Number	Type	Credits	Grade
0001	Written exam	6	G U 3 4 5
0002	Laboratory work	1.5	U G#

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Jonny Johansson, HUL SRT 2017-01-13

Syllabus established

by the Department of Computer Science and Electrical Engineering 2007-02-28