

SYLLABUS

Basic Automatic Control

7.5 credits R0001E

Grundläggande reglerteknik

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2023-02-15

Basic Automatic Control 7.5 credits R0001E

Grundläggande reglerteknik

First cycle, R0001E

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 knowledge of differential equations and complex numbers, corresponding to the course M0052M - Differential Equations and Transform Theory, 7,5 Credits.

Selection

The selection is based on 1-165 credits.

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 and the hardware necessary in a control system
- demonstrate a basic knowledge of proven methods for designing controllers.
- demonstrate the ability to model and simulate dynamic systems.
- 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 the 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.

Contents

Introduction: Examples of modern control systems. Terms and definitions. Models: Differential equations of physical dynamic systems. Control Mathematics: The Laplace transform. Block diagram models. Linearization. Simulation: MATLAB Feedback Control: Properties of Feedback. Steady-state Tracking. PID-controllers. Anti-windup compensation. Stability. Stability criterions. The Frequency-response Design Method: The Bode plot technique. Stability and stability margins. Controller design: Ziegler-Nichols methods. Frequency design methods. Digital Control: Digitization. The transfer function of sampled-data systems. Translating of analog design. Discrete design. Hardware characteristics. Sampling-rate selection.

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, seminars and lab work. The lectures are pre-recorded and the seminars (voluntary) are held in the form of web meetings. The lab assignments are performed independently in groups of no more than 3 students and the results are demonstrated in writing and orally in a web meeting. The course is given in Swedish.

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.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course R0001E is equal to SMR043, R0005E, R0004E, R0003E, R0002E

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0004	Laboratory work	U G#	2.5	Mandatory	A22	
0005	Written exam	G U 3 4 5	5	Mandatory	A22	

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 Robert Brännström 2023-02-15

Syllabus established

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