Automatic Control

Programme course

6 credits

Reglerteknik

TSIU61

Valid from: 2017 Spring semester

Determined by

Board of Studies for Mechanical
Engineering and Design

Date determined

2017-01-25

Main field of study

Electrical Engineering

Course level

First cycle

Advancement level

G1X

Course offered for

- Computer Engineering, B Sc in Engineering
- Chemical Analysis Engineering, B Sc in Engineering
- Engineering Electronics, B Sc in Engineering
- Mechanical Engineering, B Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Calculus and Linear algebra

Intended learning outcomes

After completing this course students should be able to describe the basic requirements for and limitations of automatic control. Students should also be able to perform analysis and systematic construction of feedback control systems. This means that students will be expected to be able to do the following after completing this course:

- Define basic concepts in the area of automatic control.
- Transform mathematical models of linear dynamic systems between time domain input/output form and transfer function form.
- Analyse models of linear dynamic systems that are given in the forms above with respect to stability, pole placement, rise time and damping.
- Demonstrate the connections between the system properties of stability, rise time and damping in time and frequency domains.
- Derive input/output signal relationships in feedback control systems using block diagram calculations.
- Perform stability analysis of feedback control systems using Bode diagrams.
- Construct regulators in PID-form and lead-lag form based on given specifications.
- Perform simple robustness analysis of feedback control systems.
- Formulate the specifications for a feedback control system for a lab-process, then model, construct and verify that system.

Course content

Dynamic systems. Feedback, PID-control. Differential equations. Transfer functions. Block diagram algebra. Stability. Frequency description. Compensation. Introduction to sensitivity and robustness. Control structures. Implementation. Simulation. Components.

Teaching and working methods

Lectures, lessons and laboratory work.

Examination

LAB1	Laboratory Work	1.5 credits	U, G
TEN1	Written Examination	4.5 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för systemteknik

Director of Studies or equivalent

Johan Löfberg

Examiner

Gustaf Hendeby

Course website and other links

http://www.control.isy.liu.se/student/tsiu61/

Education components

Preliminary scheduled hours: 64 h
Recommended self-study hours: 96 h

Course literature

Additional literature

Books

Glad T, Ljung L, *Reglerteknik grundläggande teori*

Compendia

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.