



HÖGSKOLAN I GÄVLE

Multivariable and Nonlinear Control Systems 7.5cr

Flervariabel och olinjär reglerteknik 7,5hp

Set by Faculty of Engineering and Sustainable Development

Version

Set at

Valid from

10/11/13

HT2014

Level	A1F
Education level	Second cycle
Course identifier	EEA301
Credits	7.5cr
Main field of study	Electronics
Subject group	Electronics
Disciplinary domain	Technology 100.0%

Learning outcomes

The aim of the course is to give a deeper knowledge in two topics; non-linear control theory and multivariable control theory.

After completion of the course the student shall be able to

1. describe commonly used mathematical tools for modelling and stability analysis of nonlinear systems
2. describe commonly used mathematical tools for multivariable control theory
3. explain the use of observers in control system
4. apply basic system identification and adaptive control methods
5. perform sensitivity and robustness analysis of control system
6. design controllers for nonlinear systems
7. describe optimal control
8. implement control algorithms in software
9. describe results from scientific reports within the the area.

Course content

Introduction to discrete-time controllers
Observers
System identification
Adaptive control

Sensitivity analysis
 Multivariable control theory
 LQG
 Robustness analysis
 H-infinity control design
 Modelling nonlinear systems
 Nonlinear systems - Stability analysis
 Lyapunov functions
 Circle criterion
 Nonlinear systems – Control design
 Optimal control

Teaching The education is performed as lectures, assignments and laboratory exercises. Emphasis is put on the student's ability of accomplishing and reporting the assignments and laboratory work. The lectures are not mandatory for the student.

Prerequisites Stochastic Processes 7.5 cr and Sensors and Measurement Technology 7.5 cr or equivalent.

Examination Written examination, assignments and laboratory work.

Grade A, B, C, D, E, Fx, F

Other regulations Criteria for final grade will be given at the beginning of the course.

Sustainable environment A minor part of the course content deals with sustainable development.

Module

0010	Written examination	5cr	Grade: AF
0020	Assignments	1.5cr	Grade: AF
0030	Laboratory work	1cr	Grade: UG