

March 1, 2011

DUTCH INSTITUTE OF SYSTEMS AND CONTROL

Course System and Control Theory of Nonlinear Systems 2011

TIME and PLACE

Time: Mondays, February 28, March 7, 14, 21, April 4, 11, 18, May 2, 2011,
13.45 – 16.00 h

Place: Hogeschool Domstad, Koningsbergerstraat 9, 3531 AJ Utrecht, 030-2927777

LECTURERS

Prof. H. Nijmeijer
Department of Mechanical Engineering
Eindhoven University of Technology
PO Box 513
5600 MB Eindhoven
Phone: 040-2473203/4817
e-mail: h.nijmeijer@tue.nl
<http://www.mate.tue.nl/mate/showemp.php/953>

Prof. A.J. van der Schaft
Johann Bernoulli Institute for Mathematics and Computer Science
University of Groningen
PO Box 407
9700 AK Groningen
Phone: 050-3633731/3379
e-mail: a.j.van.der.schaft@math.rug.nl
<http://www.math.rug.nl/~arjan/>

LECTURE NOTES: H. Nijmeijer, A.J. van der Schaft,
Nonlinear Dynamical Control Systems,
Springer, New York, 1990, 4th reprint 1998

CONTENTS OF THE COURSE

1. (AJvdS) Introduction. Examples of nonlinear systems.
28-02 Definition of nonlinear systems on manifolds.
Chapter 1, Chapter 2.1 with additional lecture notes (to be distributed)
2. (AJvdS) Lie brackets of vector fields. Controllability of nonlinear systems.
7-03 Examples
Chapter 2.2.1, Chapter 3.1
3. (HN) Distributions, Frobenius' theorem, invariant distributions and
14-03 controllability. Observability. System decomposition.
Chapter 2.2.2, Chapter 3.3.
4. (HN) Feedback linearization. Examples. Computed torque method.
21-03 Chapter 6.
5. (AJvdS) Controlled invariant distributions. Disturbance decoupling.
4-04 Chapter 7.1, 7.2 with additional lecture notes (to be distributed).
6. (HN) Input-output decoupling. Tracking. Examples.
11-04 Chapter 8.1.
7. (HN) Dynamic feedback, dynamic input-output decoupling, zero
18-04 dynamics.
Chapter 8.2, Chapter 11.2
8. (AJvdS) Feedback stabilization. Passivity-based control.
2-05 Chapter 10, with additional lecture notes (to be distributed).

EXAMS and GRADING

1. Students will be given three take home exams, each consisting of a set of problems, at the following times:

EXAM 1:	March 14	hand in:	April 4
EXAM 2:	April 4	hand in:	April 18
EXAM 3:	April 18	hand in:	May 9 (by mail)

The indicated periods for the take-home exams are meant to be **strict**.

2. A grade for the course will be given to the students that have fulfilled the requirements of the course. The requirements consist of a sufficient grading of all the take home exams and of regularly attending the lectures.