

Control Systems Design, SC4026

Ac.Yr. 2009/10, 1e Sem. Q1

Instructor:

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Teaching Assistants:

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SC4026 vs SC4025

- Notice that the class sc4020/21/22 offered until Ac.Yr 2008/09 has been split into two new ones:
 - sc4026 (3 EC) emphasizes broader concepts of control and is more applications oriented. For students without in-depth knowledge of classical control and without the intention to specialize in control in later studies.
 - sc4025 (6 EC) is for those who specialize in control. In depth course with proofs. Requires solid background in classical control (e.g. Bachelor 3mE). It is obligatory for MSc programme Systems and Control and the MSc track Mechanical Engineering-Control Engineering.

Class Organization

- Use of overhead slides as a support to lectures
- More details developed on the board: personal notes are advised
- Please use OH, rather than emails, for technical questions
- Indicatively: lectures on Mondays, exercise sessions on Thursdays
- Assessment: Theoretical concepts, Modeling Exercises, Simulations (with MATLAB, 8A-1 & 4A-0)
- **Grading:** Three Homeworks (30%), plus Final Written Exam (70%)
Grading for retake: Written Exam (100%)

- HW's: due in class about 10 days after distribution (note: no late submissions); collaboration is OK, but no group solutions are to be accepted: *hand in your own homework*
- Final: Thu Nov. 5th, 9:00AM-12:00noon, ~ 3 hours, closed-books, no collaboration
- Please enroll on Blackboard, to receive email updates (email contents will also appear as permanent Announcements)
- Please check back frequently for updates on Blackboard, or equivalently on the following website:

<http://www.dcsc.tudelft.nl/~aabate/2009sc4026.html>

Bibliography

- **Books:**

- K.J. Astrom, R.M. Murray, “*Feedback Systems: An Introduction for Scientists and Engineers.*” Princeton University Press, 2008.
ISBN 0-691-13576-2
- B. Friedland, “*Control Systems Design: An Introduction to State-Space Methods.*” Dover, 2005.
ISBN 0-486-44278-0

- Additional references intended to fill up theoretical gaps:

- E.A. Coddington, “*An Introduction to Ordinary Differential Equations.*” Dover, 1989.
- D.C. Lay, “*Linear Algebra and its Applications.*” Pearson, 2005.

- Other references on the topics covered in class:
 - Franklin, Powell, Emami-Naeini, “*Feedback Control of Dynamic Systems.*”
 - Ogata, “*Modern Control Engineering.*”
 - Chen, “*Linear Systems Theory and Design.*”

Organization of Classes

Week	Monday	Thursday
36		Intro & Lecture 1
37	Lecture 2	Exercises 1
38	Lecture 3 & Hw. 1 out	Exercises 2
39	Lecture 4	Exercises 3 & Hw. 1 due
40	Lecture 5 & Hw. 2 out	Exercises 4
41	Lecture 6	Exercises 5 & Hw. 2 due
42	Lecture 7 & Hw. 3 out	Exercises 6
43	Lecture 8	Exercises 7 & Hw. 3 due

Topics covered in the Lectures

Lecture 1	Intro, Role of Feedback and of Control, Examples
Lecture 2	Ordinary Differential Equations
Lecture 3	Linear Systems Theory
Lecture 4	State Feedback
Lecture 5	Output Feedback
Lecture 6	Duality, Separation Principle
Lecture 7	Design of Control Systems - Frequency Domain
Lecture 8	Foundations of Digital Control Design

- First class (Lecture): Thu., Sept. 3rd
- Last class (Exercise Session): Thu., Oct. 22nd
- Final (Written Exam): Thu., Nov. 5th