

Course information and lecture plan, TTK4210

Advanced control of industrial processes

Instructor:

Professor Morten Hovd
 e-mail: morten.hovd@itk.ntnu.no
 Office: Elektro D340
 Phone: (735)91426

Teaching assistant:

Jonatan Klemets
 e-mail: jonatan.klemets@itk.ntnu.no
 Office: D351A
 Phone: (735)90243

Lectures: Mondays 10 - 12, KJL23 Kjelhuset
 Tuesdays 14 – 15, KJL23, Kjelhuset¹

Exercises: Mondays 18 – 20, KJL24, Kjelhuset

Exam: 25.05.2019 All hand written and printed material allowed.

Course literature:

S. Skogestad and I. Postlethwaite: Multivariable Feedback Control. Analysis and Design. Second edition, 2005.

M. Hovd
 Course notes
 Scientific papers

Lecture plan:

Week	Topic	Literature	Exercise
2	Introduction, motivation. Some mathematical / control theory basics	Hovd, I1-I5, Ch1 – 1.3.6, 4.1 S&P, Ch. 1,2.1 – 2.4	
3	Loop shaping, SISO tuning	S&P, Ch 2.5- 2.7 Hovd, Ch. 2.5	E1
4	Short introduction to K-Spice Limitations on performance for SISO systems Introduction to MIMO systems	S&P, Ch 5 Hovd, Ch. 4 S&P, Ch. 3.1 – 3.7	E2
5	Practicalities in controller implementation Control configuration elements	Hovd, Ch 6 Hovd, Ch 2.2 S&P, Ch. 10.5	D1 E3
6	Elements of linear systems theory Limitations on performance for MIMO systems	S&P, Ch. 4, S&P, Ch 6 Hovd, Ch. 1.3, Ch. 4	D2.E4
7	Control structure design and plantwide control	S&P, Ch. 10.1–10.4 Hovd, Ch. 3	D3, E5

¹ Occasionally, there may be lectures Fridays 13 – 16 in KJL23 to compensate for any lost lectures. This will be announced in advance on Blackboard.

8	Decentralized control	S&P, Ch. 9.1, Ch. 10.6 Hovd, Ch. 2.3 – 2.5	D4
9	Model Predictive Control	Hovd Ch. 5.1-5.3,	D5,E6
10	MPC: model updating, feedforward, feasibility/constraint handling	Hovd, Ch. 5.4-5.6, Appendix A, B Additional literature	E7
11	Additional topics on MPC	Hovd, Ch. 5.7-5.11 Additional literature	
12	Controller Performance Monitoring and Diagnosis	Hovd, Ch. 7.1-7.4	E8,D7
15	Controller Performance Monitoring and Diagnosis	Hovd, Ch. 7.5-7.8	D6
16	(no lecture)		D8

Changes in the lecture plan will occur. An up to date version of the lecture plan can be found on the Blackboard.

E_i: Exercise #*i* handed out. The schedule above only indicates the week the exercise is handed out. Exercises are generally handed out on the day of exercise class, not on the day of lectures.

D_i: Deadline for handing in exercise #*i*. Any deadline given in the exercise text takes precedence over what is given here. A solution proposal will be posted on the course web pages the same day or shortly thereafter.

Exercise 6 is an extended exercise / course project that counts toward the final grade in the course.