

SYSTEMS ENGINEERING/PROCESS CONTROL

FRTF10/FRTN25

Mandatory course for W3 (6 hp) / Optional course for K4, B4 (7.5 hp)

Course program, spring 2019

Course webpage

Webpage used for both courses:

<http://www.control.lth.se/course/FRTN25>

Handouts, lab manuals, and handin instructions can be found there. Dates, times and the locations of course activities are also posted there.

Lectures

The courses have eleven lectures in common (L1–L11). Process control has two additional lectures (LX, LY). Time and location varies every week – check schedule at <http://schema.lth.se>. Lecture notes are handed out at each lecture. They are also available on the course webpages.

Charlotta Johnsson and Kristian Soltesz lecture and bare course responsible.

Exercises

The courses have eleven exercises in common (E1–E11). Process control has three additional exercises (EX–EZ). Time and location varies every week – check schedule. For every joint exercise (E1–E11), there are three different sessions.

There is one chapter in the exercise book for each exercise. E4 and E6 are computer exercises that are performed on your own computers. See further information about MATLAB below.

Teaching assistants (TAs) for the exercises are Albin Heimerson, Hamed Sadeghi and Gautham Nayak Seetanadi.

Laborations

The courses contain two joint laborations lasting four hour each (Lab 1, Lab 2). Notes should be made during the sessions, but no laboration report will be handed in. Lab 2 requires significant preparations to be meaningful. It is allowed to cooperate in the preparations, but every student should be able to explain the solutions when the lab session starts.

Laboration sign-up is done via a link from the course webpage. Deadline for sign-up is the day before the first lab session. After that, sign-up or change of lab session is not possible. If you cannot come to your lab session, it must be communicated to the responsible TA. If you miss the sign-up deadline or fail to show up without notifying the responsible TA, you will have to do the lab at a later course occasion to pass. Lab manuals are available for download via the course webpage. They should be printed and brought to the lab session.

Lab	Sign-up starts	Lab sessions	Room	Responsible TA
Lab 1	March 25	April 1–12	AC Lab C	Gautham Nayak Seetanadi
Lab 2	May 6	May 13–May 24	AC Lab C	Hamed Sadeghi

Handins and project

The courses contain two common handins (H1, H2). The tasks are, e.g., comprised of performing computations and simulations in MATLAB and interpret and value the results. Process control has an additional project. Each handin is supposed to take one full day to complete, including report writing, while to project is supposed to take four days. The handins and the project are carried out in groups of three. Group divisions are made on the lectures specified below. Manuals and files for the handins and the project are available via the course webpages.

Task	Group division	Deadline	Responsible TA
H1	April 9	April 18	Hamed Sadeghi
H2	April 15	May 8	Albin Heimerson
Project	May 9	May 24	Gautham Nayak Seetanadi

The report writing is an important part of the work. The reports will be graded both in terms of content and form. The reader should be thought of as a student colleague. The reports should have the following disposition:

- **Title page.** The title page should besides the report title specify names, email addresses, program and year of all authors, as well as handin date.
- **Introduction.** The introduction contains a short description of the problem. A discussion on how the task relates to what you have learned in previous courses may also be added.
- **Results and discussion.** The main part of the report is devoted to the questions in the manual. The running text should be well structured and have clear headlines. All claims should be well motivated and complemented with relevant calculations, diagram, and code (can also be put in an appendix).
- **Conclusion.** The final part of the report is a brief summary of the results, ideally with a reflection of what you have learned by solving the task.

The report, saved in **PDF-format**, should be sent before the deadline to:

FRTF10_FRTN25@control.lth.se

The reports are corrected and returned within ten days. If corrections must be made, a new version should be submitted within an additional ten days. Late reports will automatically be marked as failed. If a report is graded “väl godkänd”, one additional point is added to the result of the ordinary exam. The grade “väl godkänd” is exclusive for very well written reports that are correct and communicate an in-depth understanding of the studied problem. Only first submissions can be marked “väl godkänd”.

MATLAB

MATLAB is used in exercise 4, exercise 6, and in the handins. You can download MATLAB, including Simulink and the Control System Toolbox, to your laptops from

<http://program.ddg.lth.se/>

Install and test MATLAB and the toolboxes well before exercise 4!

Examination

Mandatory course activities are two labs, two handind, a project (only Process Control), and a written exam. The exam is graded U, 3, 4, 5. The exam will take place Friday June 7, 14:00-19:00 in Sparta:A-C. The handin and project reports must be finished, corrected, and passed by then. If not, they will not be corrected until the next course occasion.

Reading material

The lectures are based on the book

- *Systems Engineering and Process Control - Lecture Notes*. Department of Automatic Control, Lund University, 2016. KFS.

At the exercises, the following are used:

- *Systems Engineering and Process Control – Exercises*, Department of Automatic Control, Lund University, 2015. KFS.
- *Automatic Control – Collection of Formulae*, Department of Automatic Control, Lund University. KFS. Can also be downloaded from the course webpages.

Lecture notes and manuals for labs, handins, and project are available via the course webpages. Only allowed aids: writing material (no computer), pocket calculator (without custom software), collection of formulae (the ones above), TEFYMA.

Reading in *Systems Engineering and Process Control*, 2016

Lecture	Part	Lecture	Part
L1	1.1–1.4	L7	7.1–7.2
L2	2.1–2.5	L8	8.1–8.5
L3	3.1–3.4	L9	9.1–9.6
L4	4.1–4.3	L10	10.1–10.6
L5	5.1–5.3	LX	X.1–X.8
L6	6.1–6.2	LY	Y.1–Y.4

Exercises

Session	Exercises at session	Home exercises/repetition
E1	1.1ab, 1.2, 1.3, 1.4	1.1c, 1.5, 1.6
E2	2.1ab, 2.2, 2.3, 2.4	2.1c, 2.5, 2.6
E3	3.1, 3.2, 3.4, 3.5	3.3, 3.6, 3.7
E4	4.1, 4.2a, 4.3a, 4.4	4.2a, 4.2b, 4.5
E5	5.1, 5.2, 5.3, 5.4	
E6	6.1, 6.2, 6.3	
E7	7.1, 7.2, 7.3	7.4
E8	8.1, 8.2, 8.3, 8.4	8.5
E9	9.1, 9.2, 9.3, 9.4	9.5
E10	10.1, 10.2, 10.3	10.4
E11	Old exam	
EX	X.1, X.2, X.3, X.4	X.5, X.6
EY	Y.1, Y.2, Y.3, Y.4	Y.5
EZ	Project presentation	

Contact information

The Department of Automatic Control labs are in the M building, first floor, south part. The rest of the department is located on the 2nd and 5th floors in the south part of the M building.

Charlotta Johnsson	2nd floor	charlotta.johnsson@control.lth.se
Kristian Soltesz	2nd floor	kristian.soltesz@control.lth.se
Albin Heimerson	2nd floor	albin.heimerson@control.lth.se
Gautham Nayak Seetanadi	2nd floor	gautham.nayak_seetanadi@control.lth.se
Hamed Sadeghi	2nd floor	hamed.sadeghi@control.lth.se
Mika Nishimura (LADOK)	5th floor	mika.nishimura@control.lth.se