

Course information 2019

TTK4130 Modeling and Simulation

February 11, 2019

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Content: Mathematical modeling: Models based on state-space descriptions, with some transfer functions. Analysis based on frequency response, energy-based methods and passivity. Signal-flow versus energy-flow for interconnection of models. Development and interconnection of subsystem models in a modular approach to modeling. Models for electrical motors, hydraulics, friction, vehicles and manipulators, balance equations for process/fluid systems. Simulation of state-space models, Runge-Kutta methods, stiff systems, stability.

Learning outcome: The goal of the course is that the students should learn methods for modeling and simulation of physical plants for use in control applications.

Learning methods and activities: Lectures, problem sets, and computer exercises based on MATLAB/Simulink and Dymola, compulsory Modelica project and presentations. If there is a re-sit examination, the examination form may be changed from written to oral.

Recommended previous knowledge: TTK4105 Control Systems.

Syllabus: The course is given based on the books “Modeling and Simulation for Automatic Control” by O. Egeland and J.T. Gravdahl (ISBN 82-92356-00-2) [available: https://www.researchgate.net/publication/256492530_Modeling_and_Simulation_for_Automatic_Control] and “Introduction to Modeling and Simulation of Technical and Physical Systems with Modelica” by Peter Fritzon (ISBN: 978-1-1180-1068-6). The books can also be bought at Tapir. An errata (list of errors) for the first book can be downloaded from itslearning. The (tentative) Lecture schedule gives an indication of the curriculum; the final curriculum will be available later.

Lectures: Lectures are given Mondays 8:15-10:00 (KJL1), and Thursdays 10.15-12.00 (KJL1). See Lecture schedule for more detailed information.

Problem sets and computer exercises: There will be one problem set and/or computer exercise/project approximately every week. Exercises will be posted on blackboard. Exercise hours (with student assistants' guidance) are Mondays and Wednesdays 17.15-19.00 in EL2 and Tuesdays and Thursdays 16:15-18:00 in Computer labs G116, G118, G122. More information under Course information → Assignment Set-up

Exam: May 15th, 2019.

