

# Course Control and System Theory of Rational Systems Motivated by the Life Sciences

## Homeworksets 1 and 2

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1. Take a paper from the literature, either from a journal or from a conference proceedings, and make a simulation program of the system specified in the paper. Because systems can be quite large, you may consider to use only a part of the system. The lecturers suggest not to take a system with more than 10 states.

You are expected to show to the lecturers either figures of a simulation and a specification of the system or write a short report. The report need not be long but best includes the reference of the paper from which the system is taken. Preferably send one pdf file with the documents.

The homework set involves in general:

- Writing a short text on the background of the model.
- A definition of the state variables, the inputs, and the outputs, and possibly the constants; the definition of the differential equations.
- Simulation of the differential equation by a computer program, say by Matlab, or Octave, or by Maple, or a program with similar capabilities. Simulate the system of a horizon of your own choice for several initial conditions. You could write a few conclusions of your experiences with this system.

See Appendix G for possible papers to choose from. But you may also search for a paper yourself. The lecturers of the course hope that one or several students take the examples of a cycle system and of a mammillary system. Contact them for a reference.

The system selected can be used for the homework sets of the subsequent lectures of the course.

## Reading advice for Lecture 1

Please read of the lecture notes the Sections 2.2, 2.3, and 2.4.

The participants of the course should feel free to read what they like of the lecture notes. The advice stated above is only to indicate a minimal package of what to read for the corresponding lecture.

## Reading advice for the future Lecture 2

Please read of the lecture notes the Sections 3.2, 3.3, and 3.6. Section 3.9 is useful but the reading is not urgent. Section 3.2 is most important because it provides explanations and definitions of biochemical reaction systems.

Because particular students of a course like to read about the lecture before the lecture is presented, the most important sections of the next lecture are indicated above. The reader should not feel obliged to read these sections before Lecture 2.